BONNEVILLE POWER ADMINISTRATION

Habitat Evaluation Procedures (HEP) Report

Ladd Marsh Wildlife Area

Technical Report 2004 - 2006 | May 2006 | DOE/BP-00004656-3

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LADD MARSH WILDLIFE AREA

2005 HEP REPORT

May 2006

Oregon Department of Fish and Wildlife

Columbia Basin Fish and Wildlife Authority – Regional HEP Team

Bonneville Power Administration

LADD MARSH WILDLIFE AREA

2005 HEP REPORT

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For

Oregon Department of Fish and Wildlife

and

Bonneville Power Administration
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ABSTRACT

The Regional HEP Team (RHT) and Oregon Department of Fish and Wildlife (ODFW) staff conducted a follow-up habitat evaluation procedures (HEP) analysis on the Ladd Marsh Wildlife Management Area (LMWA) in May 2005. The 2005 HEP assessment resulted in a total of 647.44 HUs, or 0.76 HUs/acre. This is an increase of 420.34 HUs (0.49 HUs/acre) over 2001 HEP survey results. The most significant increase in HUs occurred on the Wallender and Simonis parcels which increased by 214.30 HUs and 177.49 HUs respectively.

Transects were established at or near 2001 HEP analysis transect locations whenever possible. ODFW staff biologists assisted the RHT re-establish transect locations and/or suggested areas for new surveys.

Since 2001, significant changes in cover type acreage and/or structural conditions have occurred due to conversion of agriculture cover types to emergent wetland and grassland cover types. Agricultural lands were seeded to reestablish grasslands and wetlands were restored through active management and manipulation of extant water sources including natural stream hydrology/flood regimes and available irrigation.

Grasslands increased on the Wallender parcel by 21% (65 acres), 23% (71 acres) at the Simonis site, and 39% (62 acres) at Conley Lake. The emergent wetland cover type also changed significantly increasing 60% (184 acres) at Wallender and 59% (184 acres) on the Simonis tract. Today, agriculture lands (crop and grazed pasture) have been nearly eliminated from Bonneville Power Administration (BPA) mitigation project lands located on the LMWA.

INTRODUCTION

This Habitat Evaluations Procedures (HEP) report is a follow-up to the baseline HEP study completed in October 2001 by the Oregon Department of Wildlife (ODFW), Cat Tracks Wildlife Consulting, and staff from the Umatilla and Yakama Tribes (ODFW 2001). The Regional HEP Team (RHT) conducted the follow-up analysis in May 2005 with assistance from Ladd Marsh Wildlife Area staff. The primary objective of this HEP analysis is to evaluate extant habitat conditions and compare the results to baseline wildlife habitat values reported by Oregon Department of Fish and Wildlife in 2001 and/or results described in the Errata to the Ladd Marsh Wildlife Area Additions Mitigation Project revision document (ODFW 2002).

STUDY AREA

Location/Background

The Ladd Marsh Wildlife Area is located in the heart of the Grande Ronde River Valley near the eastern base of the Blue Mountains approximately eight miles southeast of LaGrande, Oregon (Figure 1). Specific project site boundaries are delineated in Figure 2.

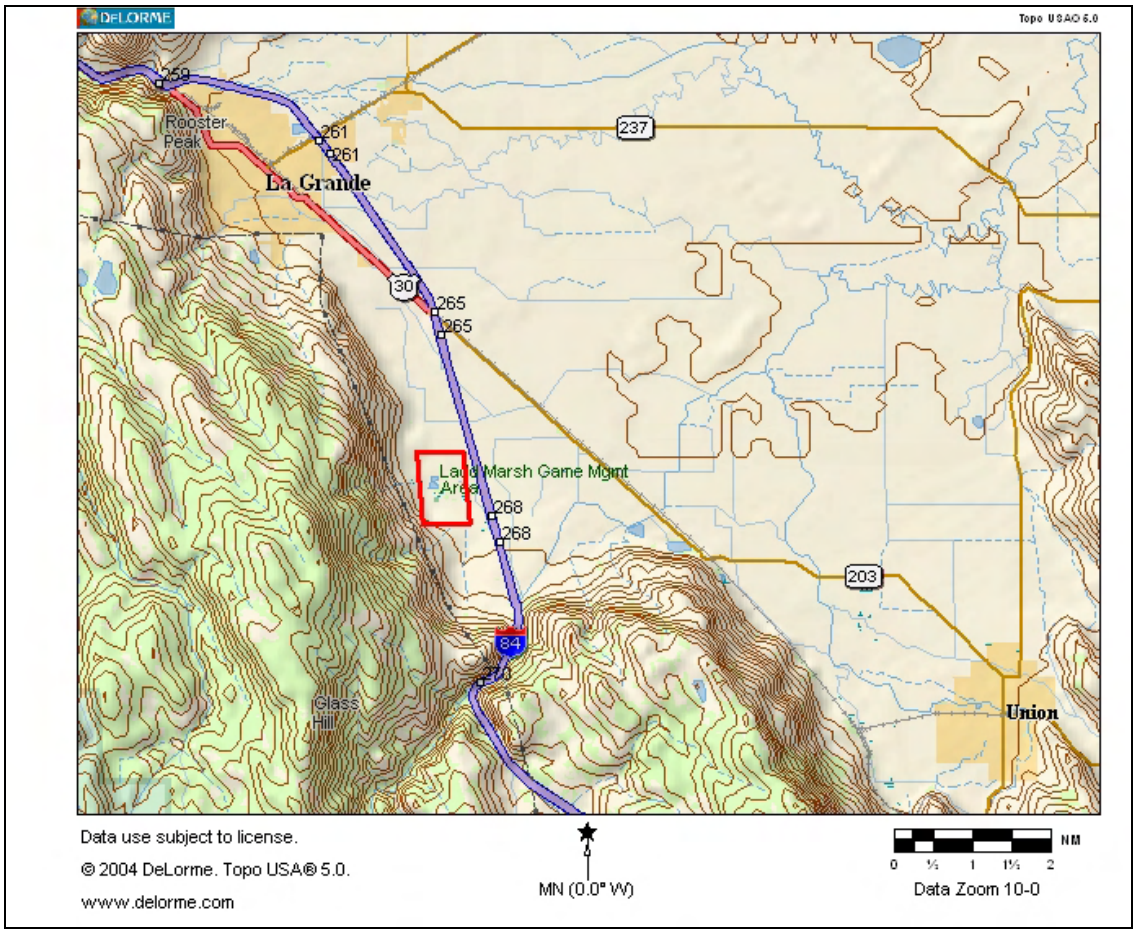

Figure 1. General location of the Ladd Marsh Wildlife Area.

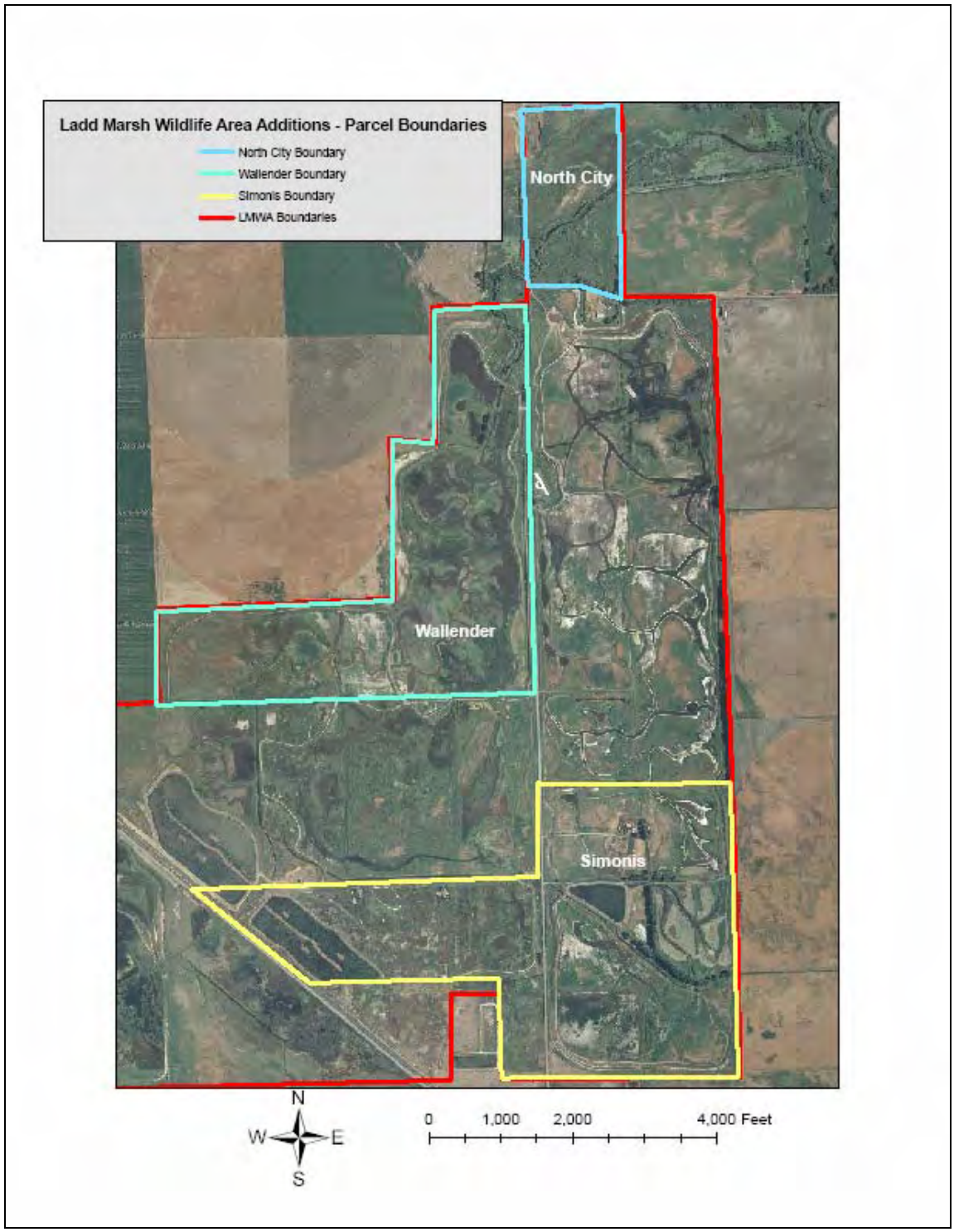

Figure 2. Ladd Marsh Wildlife Area boundary map excluding Conley Lake.

The wildlife area, historically known as Tule Lake, and the adjacent Grande Ronde River Valley included an estimated 30,000 to 40,000 acres of wetlands prior to settlement (circa 1850). Human disturbance, especially agriculture and grazing activities, significantly reduced the amount of wetlands in the valley. By 1948, extensive drainage of the Tule

Lake wetland complex left only about 500 acres of the original wetlands still intact. Soon after, the first land purchase to protect the remaining wetlands occurred at which time ODFW established the Ladd Marsh Wildlife Area. Tule marsh located on the LMWA is the largest remnant wetland in northeast Oregon (ODFW 2001). The Oregon Department of Fish and Wildlife currently manages Ladd Marsh primarily for wetland obligate species and elk winter range.

Cover Types

The Regional HEP Team used draft cover type maps provided by ODFW Ladd Marsh Wildlife Biologists for this HEP assessment (C. Nowak, pers. comm.). Finalized cover type maps were not available for inclusion in this report.

Emergent wetland is the dominant cover type on all project parcels followed by grassland. In contrast, riparian forest, agriculture, and riparian shrub scrub cover types comprise only a small percentage of the entire project area (Table 1).

Significant acreage changes occurred in the grassland, emergent wetland, and agriculture cover types between 2001 and 2005. Nearly all of the agriculture cover type on the Wallender, Simonis, and Conley Lake parcels was converted to grassland and emergent wetlands.

Grasslands increased on the Wallender parcel by 21% (65 acres), 23% (71 acres) at the Simonis site, and 39% (62 acres) at Conley Lake. The emergent wetland cover type also changed significantly increasing 60% (184 acres) at Wallender and 59% (184 acres) on the Simonis tract. Minor acreage differences for other cover types are noted in Table 1.

Table 1. Current and baseline cover type acreage comparison and summary.

PARCEL	COVER TYPES	2005		2001		CHANGE	
		Acres[1]	Percent	Acres[1]	Percent	Acres	Percent
Wallender	Riparian Forest	1.00	0.32%	0.00	0.00%	1.00	0.32%
	Riparian Shrub-Scrub	13.00	4.21%	14.17	4.58%	-1.17	-0.37%
	Emergent Wetland	184.00	59.55%	0.00	0.00%	184.00	59.55%
	Open Water	42.00	13.59%	0.00	0.00%	42.00	13.59%
	Grassland	65.00	21.04%	0.00	0.00%	65.00	21.04%
	Agriculture	4.00	1.29%	295.49	95.42%	-291.49	-94.13%
Total		**309.00**	**100.00%**	**309.66**	**100.00%**	**-0.66**	**0.00%**
Simonis	Riparian Forest	8.00	2.56%	0.00	0.00%	8.00	2.56%
	Riparian Shrub-Scrub	0.00	0.00%	7.82	2.50%	-7.82	-2.50%
	Emergent Wetland	206.00	65.81%	21.60	6.90%	184.40	58.91%
	Open Water	19.00	6.07%	0.00	0.00%	19.00	6.07%
	Grassland	71.00	22.68%	0.00	0.00%	71.00	22.68%
	Agriculture	5.00	1.60%	279.81	89.39%	-274.81	-87.79%
	Residential	4.00	1.28%	3.80	1.21%	0.20	0.07%
Total		**313.00**	**100.00%**	**313.03**	**100.00%**	**-0.03**	**0.00%**
North City	Riparian Shrub-Scrub	19.00	25.33%	18.53	24.86%	0.47	0.48%
	Emergent Wetland	39.00	52.00%	39.42	52.88%	-0.42	-0.88%
	Open Water	0.00	0.00%	0.00	0.00%	0.00	0.00%
	Grassland	17.00	22.67%	16.60	22.27%	0.40	0.40%
Total		**75.00**	**100.00%**	**74.55**	**100.00%**	**0.45**	**0.00%**
Conley Lake	Emergent Wetland	99.00	61.49%	99.08	61.51%	-0.08	-0.02%
	Grassland	62.00	38.51%	0.00	0.00%	62.00	38.51%
	Agriculture	0.00	0.00%	61.99	38.49%	-61.99	-38.49%
Total		**161.00**	**100.00%**	**161.07**	**100.00%**	**-0.07**	**0.00%**

[1] **Minute acreage differences are likely an artifact of GIS mapping.**

Cover types are described below for each parcel. Descriptions are based on HEP transect results.

Riparian Forest

This habitat type is found only on the Wallender and Simonis tracts and is restricted to a narrow strip along drainage areas. A typical riparian forest cover type is illustrated in Figure 3.

Figure 3. Typical riparian forest located on the Simonis parcel.

Wallender

This cover type occurs on one acre or less than 1% of the parcel and is dominated by several willows (*Salix* spp.) including black willow (*Salix nigra*). Mean tree canopy cover is 91.3% while shrubs are absent from the understory. Herbaceous vegetation is predominantly catchweed bedstraw (*Asperugo procumbeus*), poison hemlock (*Conium maculatum*), and reed canarygrass (*Phalaris arundinacea*). Herbaceous cover averages 70.6% with a mean height of approximately 8 inches.

Simonis

The riparian forest cover type occurs on 8 acres or 2.6% of the parcel and is comprised of several willow species. Mean tree canopy cover is 84.4%. The shrub layer[1] is dominated by rose (*Rosa* sp.) (35% cover) and includes currant (*Ribes* sp.), willow, and hawthorn (*Crataegus* sp.).

[1] The shrub layer includes all woody vegetation less than 16 feet in height.

Riparian Scrub-Shrub

This habitat type occurs along Ladd Creek and adjacent drainages within the greater Ladd Marsh watershed area. The riparian scrub-shrub cover type occurs on approximately 32 acres within the Wallender and North City parcels and is currently absent on the Conley Lake and Simonis tracts. An example of the riparian scrub-shrub cover type is illustrated in Figure 4.

Figure 4. An example of the scrub-shrub cover type.

Wallender

The riparian scrub-shrub cover type encompasses 13 acres (4%) of the Wallender parcel. Shrub species included aspen (*Populus tremuloides*), black hawthorne (*Crataegus douglasii*), and red-osier dogwood (*Cornus stolonifera*). Mean herbaceous cover was 80.8% with reed canarygrass dominating the herbaceous understory. Wiregrass (*Juncus* spp.) and salt grass (*Disticlis* spp.) were also present.

North City

The only shrub species present on the 19 acres of riparian scrub-shrub was coyote willow (*Salix exigua*), which averaged 42.7% cover. Mean shrub height was 5.96 feet. Like other parcels, reed canarygrass dominated the herbaceous layer with wiregrass and salt grass present. Mean herbaceous cover was 48.7% and averaged 16 inches in height.

Emergent Wetland

The emergent wetland cover type occurs on 528 acres within BPA mitigation project lands. Emergent wetlands are diverse and vary in plant composition and structural conditions. A typical emergent wetland complex is shown in Figure 5.

Figure 5. A typical emergent wetland.

Wallender

Approximately 60% (184 acres) of the Wallender parcel is comprised of emergent wetlands. The dominant vegetation on this site includes hard-stem bulrush (*Scirpus acutus*), common spike rush (*Eleocharis palustris*), common cattail (*Typha latifolia*), and reed canarygrass.

Simonis

Emergent wetlands occur on 206 acres (≈ 66%) of the Simonis parcel. Common spike rush, Baltic rush (*Juncus balticus*), common cattail, hard-stem bulrush, smartweed (*Polygonum* spp.) and reed canarygrass are the dominant wetland plant species.

North City

The North City parcel includes 39 acres of emergent wetland (52% of the parcel). Reed canarygrass and several species of rushes dominated the wetland plant community. Mean percent cover of emergent vegetation was less than 50%.

Conley Lake

Although the Conley Lake parcel was nearly devoid of surface water, approximately 62% (99 acres) of this site is designated emergent wetland. Herbaceous vegetation present included several types of rush, prickly lettuce (*Lactuca serriola*), salt grass, bottlebrush squirreltail, and several species of brome (*Bromus* spp.). Herbaceous percent cover was 50.9% while mean water depth, where present, was approximately 2.5 inches.

Open Water

The open water cover type occurs only on the Wallender and Simonis parcels. Shoreline cover and plant composition vary within and between both sites. An example of the open water cover type is depicted in Figure 6.

Figure 6. An example of the open water cover type and typical shoreline vegetation.

Wallender

Approximately 14% (42 acres) of the Wallender parcel is comprised of the open water cover type. Similar to emergent wetlands, shoreline vegetation includes common cattail, reed canarygrass, Baltic rush, and common spike rush.

Simonis

Nineteen acres of open water habitat occurs on the Simonis tract (≈ 6% of the site). Shoreline vegetation included common cattail, reed canarygrass, hard-stem bulrush, common spike rush, and other herbaceous species.

Grassland

This cover type occurs on all parcels. Dominant grass species included intermediate wheatgrass (*Thinopyrum intermedium*) and reed canarygrass. Flixweed (*Descurainia sophia*), introduced barley (*Hordeum* spp.), hoary cress (*Cardaria draba*) and catchweed bedstraw were also present. A typical grassland dominated by intermediate wheatgrass is illustrated in Figure 7.

Figure 7. An example of the grassland cover type.

Wallender

Approximately 21% (65 acres) of the Wallender parcel is comprised of the grassland cover type. Grass and forbs species observed included intermediate wheatgrass, reed canary grass, introduced brome, poison hemlock, tall tumble mustard (*Sisymbrium altissimum*), common teasel (*Dipsacus fullonum*), introduced thistle (*Cirsium* spp.), and hoary cress. The average herbaceous cover was 88.65% and a mean height of 6 inches. Herbaceous cover height ranged from ≈ 4 to 8 inches.

Simonis

The Simonis parcel is comprised of 71 acres of grassland (≈ 23% of the site). Herbaceous vegetation was predominately reed canarygrass and intermediate wheatgrass, but also included flixweed, introduced barley, and catchweed bedstraw. The average herbaceous cover was 92.8% with a mean height of 14 inches (range: 5 to 24 inches). .

North City

Seventeen acres of grassland occurs on the northern portion of the property (≈ 23% of the parcel). This cover type was dominated by intermediate wheatgrass and reed canarygrass. The average herbaceous cover was 92.5% with a mean height of 4 inches.

Conley Lake

Approximately 39% (62 acres) of the Conley Lake parcel is comprised of grassland. The dominant grass and forbs species observed included basin wildrye (*Elymus cinereus*), cheatgrass (*Bromus tectorum*), and introduced thistle. The average herbaceous cover was 31% with a mean height of 4 inches.

Agriculture Crop

This cover type makes up less than 9 acres (<1%) of the total project area. The agriculture crop cover type presently occurs only on the Wallender and Simonis parcels and includes small grains, alfalfa (*Medicago sativa*), and hay production (ODFW 2001).

The Regional HEP team used ocular estimation to assess the agriculture cover type in 2005. Additional information on this cover type was provided by ODFW Ladd Marsh project staff (C. Nowak, pers. comm.) and data found in the Ladd Marsh Wildlife Area Addition Mitigation Project document (ODFW 2001).

Wallender

The Wallender parcel includes 4 acres of agricultural land (≈ 1% of the site). Spring wheat (*Triticum aestivum*), alfalfa, and barley were the principle crops. Other non-native herbaceous species noted included bulbous bluegrass (*Poa bulbosa*), tall wheatgrass (*Thinopyrum ponticum*) and kochia (*Kochia scoparia*). ODFW staff reported that cheat grass, thistle, and whitetop also occurred in pasture lands (ODFW 2001).

Simonis

Approximately 1.6% (5 acres) of the Simonis parcel is comprised of the agriculture cover type. Vegetation composition is similar to that described for the Wallender property. Further information on the Simonis agriculture cover type can be found in the Ladd Marsh Wildlife Area Additions Mitigation document (ODFW 2001).

METHODS

Habitat Evaluation Procedures

A habitat evaluation procedures analysis was conducted at the Ladd Marsh Wildlife Area to document changes in habitat quality relative to 2001 baseline habitat conditions. HEP, developed by the U.S. Fish and Wildlife Service (USFWS), is used to quantify the impacts of development, protection, and restoration projects/measures on terrestrial and aquatic habitats by assessing changes, both negative and positive, in habitat quality and quantity (USFWS 1980), (USFWS 1980a).

HEP is a habitat based approach to impact assessment that documents change through use of a habitat suitability index (HSI). The HSI value is derived from an evaluation of the ability of key habitat components to provide the life requisites of selected wildlife and fish species.

The HSI value is an index to habitat carrying capacity for a specific species or guild of species based on a performance measure (e.g. number of deer per square mile) described in HEP species models. The index ranges from 0.0 to 1.0. A HSI of 0.3 indicates that habitat quality/carrying capacity is marginal while a HSI of 0.7 suggests that habitat quality/carrying capacity is relatively good for a particular species (Table 2).

Table 2. Habitat suitability index verbal equivalency table.

Habitat Suitability Index	Verbal Equivalent
0.0 < 0.2	Poor
0.2 < 0.4	Marginal
0.4 < 0.6	Fair
0.6 < 0.9	Good
0.9 < 1.0	Optimum

Each increment of change is identical. For example, a change in HSI from 0.1 to 0.2 represents the same magnitude of change as a change from 0.2 to 0.3, and so forth. Habitat variables, suggested mensuration techniques, and mathematical aggregations of assessment results are included in HEP evaluation species models.

HEP Model Selection

HEP model selection for the 2005 HEP assessment was based on habitat types and species models identified in the Lower Snake River Loss Assessment (COE 1989) (Table 3). The 2005 Ladd Marsh HSI model/cover type matrix is shown in Table 4 and

compared to the number of HSI models used in the Lower Snake River Loss Assessment matrix (A. Sondenaa, pers. comm.) in Table 5.

Similarly, the 2005 and 2001 (baseline) HEP species/cover type matrices are shown in Tables 4 and 6 respectively. The most significant difference is the increased number of HEP species used in the grassland cover type during the 2005 analysis, which matches the number of species used in the Lower Snake River Loss Assessment (COE 1989). Other minor variations include differences in the number of species used to evaluate the palustrine forest, palustrine emergent, and agriculture cover types (Table 7).

Table 3. The Lower Snake River habitat loss assessment species/cover type matrix[2].

HEP MODEL	COVER TYPES												
	Pal. Forest	Pal. Scrub-Shrub	Pal. Emergent	Shoreline	Pal. Open Water	Mesic Shrub	Forbland	Agricultural Crop	Shrub steppe Low Canopy	Shrub steppe High Canopy	Grassland	Rock/Talus	Pasture
Downy Woodpecker	X												
Song Sparrow	X					X							
Yellow Warbler		X											
Marsh Wren			X										
Western Meadowlark							X		X	X	X		
Mule Deer	X	X				X	X		X	X	X		
Chukar						X			X	X	X	X	
California Quail	X	X				X	X	X	X	X	X		
Ring-Necked Pheasant	X	X	X			X	X	X	X	X			X
Mallard					X								
River otter				X									
Canada Goose				X									
TOTAL	5	4	2	2	1	5	4	2	5	5	4	1	1

[2] The Lower Snake Loss Assessment species/cover type matrix was developed by Angela Sondenaa (Nez Perce Tribe wildlife biologist) in 2005.

Table 4. Ladd Marsh Wildlife Area 2005 HEP species/cover type matrix.

HEP MODEL	COVER TYPES												
	Pal. Forest	Pal. Scrub-Shrub	Pal. Emergent	Shoreline	Pal. Open Water	Mesic Shrub	Forbland	Agricultural Crop	Shrubsteppe Low Canopy	Shrubsteppe High Canopy	Grassland	Rock/Talus	Pasture
Downy Woodpecker	X												
Song Sparrow	X												
Yellow Warbler	X	X											
Marsh Wren			X										
Western Meadowlark											X		
Mule Deer		X									X		
Chukar													
California Quail	X	X						X			X		
Ring-Necked Pheasant	X	X						X			X		
Mallard					X								
River otter													
Canada Goose			X										
TOTAL	5	4	2		1			2			4		

Table 5. Comparison of the number of HEP models used in the Lower Snake River Loss Assessment and 2005 Ladd Marsh HEP analyses.

PROJECT MATRICES	COVER TYPES/NUMBER of HEP MODELS												
	Pal. Forest	Pal. Scrub-Shrub	Pal. Emergent	Shoreline	Pal. Open Water	Mesic Shrub	Forbland	Agricultural Crop	Shrub steppe Low Canopy	Shrub steppe High Canopy	Grassland	Rock/Talus	Pasture
Lower Snake matrix	5	4	2	2	1	5	4	2	5	5	4	1	1
2005 HEP matrix	5	4	2	N/A	1	N/A	N/A	N/A	N/A	N/A	4	N/A	N/A
Difference	0	0	0	N/A	0	N/A	N/A	N/A	N/A	N/A	0	N/A	N/A

Table 6. Ladd Marsh Wildlife Area 2001 HSI model/cover type species matrix.

LOSS ASSESSMENT PROJECT: LADD MARSH (2001)													
HEP MODEL	COVER TYPES												
	Pal. Forest	Pal. Scrub-Shrub	Pal. Emergent	Shoreline	Pal. Open Water	Mesic Shrub	Forbland	Agricultural Crop	Shrub steppe Low Canopy	Shrub steppe High Canopy	Grassland	Rock/Talus	Pasture
Downy Woodpecker	X												
Song Sparrow	X												
Yellow Warbler		X											
Marsh Wren													
Western Meadowlark													
Mule Deer													
Chukar													
California Quail	X	X						X			X		
Ring-Necked Pheasant	X	X	X					X					
Mallard													
River otter													
Canada Goose			X		X			X					
TOTAL	4	3	2		1			3			1		

Table 7. Comparison of the number of HEP models used in the Lower Snake River Loss Assessment and 2001 Ladd Marsh HEP analyses.

PROJECT MATRICES	COVER TYPES/NUMBER of HEP MODELS												
	Pal. Forest	Pal. Scrub-Shrub	Pal. Emergent	Shoreline	Pal. Open Water	Mesic Shrub	Forbland	Agricultural Crop	Shrub steppe Low Canopy	Shrub steppe High Canopy	Grassland	Rock/Talus	Pasture
Lower Snake River/2005 HEP matrices	5	4	2	2	1	5	4	2	5	5	4	1	1
2001 HEP matrix	4	3	2	N/A	1	N/A	N/A	3	N/A	N/A	1	N/A	N/A
Difference	-1	-1	0	N/A	0	N/A	N/A	+1	N/A	N/A	-3	N/A	N/A

HEP Species Models

HEP species used during the 2005 assessment are summarized below. Abbreviated HEP species models are included in Appendix A ("scanned copies").

1. Marsh Wren *(Cistothorus palustris*): the marsh wren model (Gutzwiller and Anderson 1987) was used to evaluate the emergent wetland cover type. Variable 1 "growth form of emergents" was modified, with concurrence from ODFW staff (C. Nowak, pers. comm.), to fit habitat conditions found at Ladd Marsh. Variable 1 was modified by changing the four growth form categories listed in the original model (Gutzwiller and Anderson 1987) to three categories. The three categories and associated suitability index (SI) values are as follows:

   Variable 1: Growth form of emergents
   1. Cattail and bulrush (S.I. = 1.00)
   2. Reed canarygrass (S.I. = 0.50)
   3. Other vegetation (S.I. = 0.10)

   Unlike Gutzwiller and Anderson (1987), the SI for variable 1 was determined by weighting the percent cover of each category by the relative amount. An example of how the suitability index was calculated is shown below.

   Transect results
   10% bulrush
   30% reed canarygrass
   20% other

   Weighted S.I. values
   0.10 x 1.00 = 0.10
   0.30 x 0.50 = 0.15
   0.20 x 0.10 = 0.02

   SI value = 0.27

   Suitability indices for all other variables (V2, V3, and V4) and the overall HSI were determined as suggested in the original marsh wren model (Gutzwiller and Anderson 1987).

2. Yellow warbler (*Dendroica petechia*): The yellow warbler model (Shroeder 1982) was used to evaluate the riparian scrub-shrub cover type.

3. Mule Deer (*Odocoileus hemionus*): The mule deer model (COE 1989) was used as a substitute for the chukar model to evaluate grassland and riparian scrub-shrub cover types.

4. Western meadowlark (*Sturnella neglecta*): The western meadowlark model (Shroeder and Sousa 1982) was used to evaluate the grassland cover type.

5. California quail (*Callipepla californicus*): The California quail model (COE 1989) was used to evaluate the riparian forest, riparian scrub-shrub, and grassland cover types.

6. Canada goose (*Branta canadensis*): The Canada goose model (COE 1989) was used to evaluate the emergent wetland cover type.

7. Ring-necked pheasant (*Phasianus colchicus*): The ring-necked pheasant model (COE 1989) was used to evaluate the riparian forest, riparian scrub-scrub, and grassland cover types.

8. Song sparrow (*Melospiza melodia*): The song sparrow model (COE 1989) was used to evaluate the riparian forest cover type.

9. Downy woodpecker (*Picoides pubescens*): The downy woodpecker model (Shroeder 1982) was used to evaluate the riparian forest cover type.

10. Mallard (*Anas platyrhynchos*): The mallard model (COE 1989) was used to evaluate the open water cover type.

Sampling Design and Measurement Protocols

Pilot studies were conducted to estimate the sample size needed for a 95% confidence level with a 10% tolerable error level (Avery 1994) and to determine the most appropriate sampling unit for the habitat variable of interest i.e., a coefficient of variation analysis (BLM 1998). In addition, a power analysis was conducted on pilot study data (and periodically throughout data collection) to ensure that sample sizes were sufficient to identify a minimal detectable change of 20% in the variable of interest with a Type I error rate ≤ 0.10 and $P = 0.9$ (BLM 1998, Block et al. 2001).

Metrics

1. Herbaceous measurements were recorded at 20 or 25-foot intervals on the right side of the transect tape (the right side is determined by standing at 0 feet and facing the line of travel/transect azimuth). RHT members walked on the left side of the transect line to reduce sample disturbance. A square $0.1m^2$ micro-plot grid was used in grasslands to estimate percent cover of herbaceous vegetation while a rectangular $0.5m^2$ grid was used in shrublands. The near right hand corner of the grid is placed at the sampling interval (rectangle grids are placed with the long axis perpendicular to the tape, and the lower right corner on the sampling interval). Grid samples are considered independent samples for statistical purposes. *The Robel pole (Robel 1975) was not used to estimate herbaceous visual obstruction readings (VOR) during this analysis.*

2. Herbaceous height was measured with a measuring rod placed within the grid frame (scale = 10ths/inches). Three evenly spaced measurements are recorded and averaged for each sample. Only leaf material is measured (leaves provide the greatest amount of cover). Grass inflorescence is not included in height measurements.

3. Line intercept or point intercept (USFWS 1981) was used to determine shrub cover. Line intercept was used when shrub cover was estimated at < 5% (the most accurate results are obtained using the line intercept method). In contrast, the point intercept method was used if shrub cover was estimated at > 5%.

   If shrub canopy cover was estimated at 5% to 20%, point data was collected at two-foot intervals (50 possible "hits" per 100 ft. sample unit). If shrub cover was estimated at >20%, shrub point data was collected at five foot intervals (20 possible "hits" per 100 ft. sample unit). Regardless of method, the sampling unit was a 100-foot segment of the transect for statistical purposes.

   Shrub cover was estimated for impenetrable or otherwise inaccessible shrub thickets using a modified point method. A baseline transect was established along the shrub edge. A six-foot measuring rod was then inserted into the shrub cover at a perpendicular angle to the baseline tape at appropriate intervals. Recorders estimated shrub "hits", species information, and height data where the end of the six-foot measuring rod intercepted the shrub cover.

4. Shrub height was measured at the highest point for each line intercept segment or the tallest point at the intercept mark (point intercept). Overlapping shrub canopies were recorded by shrub species as structurally complex shrub communities (rather than simple shrub communities).

5. Shrub density was collected in grasslands to document the occurrence of trace amounts of shrubs (<1% cover). Shrubs were counted within a 0.1 acre belt transect that paralleled the transect line (22 feet on each side of the tape). Each 100 foot sampling unit equaled approximately 0.1 acre. *Shrub density was not evaluated for this analysis.*

6. Tree canopy cover measurements were recorded at five or ten foot intervals with a densitometer. Measurement intervals were determined by visually estimating tree canopy closure prior to initiating the survey. If estimated canopy closure was less than 10%, measurements were recorded at five-foot intervals; if estimated greater than 10% canopy closure, ten-foot intervals were used. As with shrubs, the sampling unit is a 100 foot segment of the transect.

7. Snag data was documented on belt transects. RHT members collected snag data in conjunction with tree canopy closure measurements using the same baseline transect. Snags, if present, were detected and recorded within a tenth-acre belt

transect paralleling the baseline transect (44 feet wide by 100 feet long i.e., 22 feet on each side of the baseline transect). As with shrubs and trees, the sampling unit is each 100-foot segment.

8. Tree basal area data was collected at 100-foot intervals using a "factor 10" prism. Each 100-foot interval basal area observation (all tree "hits" at each 100-foot point) were considered independent samples.

9. Photo points were established at the start point of each transect. Pictures were recorded from a height of three feet at the beginning of each transect facing the transect azimuth. A reference cover board was placed at the 30 foot mark on each transect. Occasionally, panoramic photographs were also taken. Habitat conditions were photographed with a Canon G1® 3.3 pixel digital camera (with and without magnification) (Appendix B).

Sample Size Determination

The process for determining sample size (transect length) varied based on the variable measured. Shrub and tree cover and grid sample sizes were estimated as follows:

Percent cover within each 100 foot sample unit was divided by sample unit length to obtain percent shrub/tree cover per sample unit (e.g. 10 feet of cover/100 feet = 10% shrub cover). The standard deviation for each transect was calculated for percent cover data from transect sample units. Sample size (transect length) was then determined through use of the following equation (Avery 1994):

$$n = \frac{t^2 s^2}{E^2}$$

Where: t = t value at the 95 percent (0.05) confidence interval for the appropriate degrees of freedom (*df*); s = standard deviation; and E = desired level of precision, or bounds (± 10 percent). The same method was used to determine sample size for grids based on total percent cover for herbaceous species[3].

Transect Locations

Transect initial points (IPs) were established based on the original transect locations from the 2001 HEP analysis. ODFW staff biologists assisted the RHT re-establish transect locations on or near the original 2001 HEP transect points where possible. Transect UTM coordinates, including start, turn, and end points were documented with a Garmin IIIA ® GPS unit. UTM coordinates for the 2005 HEP analysis are summarized in Tables 8, 9, 10, and 11 while transect locations for each parcel are illustrated in Figures 8, 9, 10, and 11 (map Figures provided by C. Nowak, ODFW).

[3] Cover type acreage was insufficient to meet statistical objectives in some areas.

Table 8. Wallender parcel HEP transect UTM coordinates, magnetic azimuths, and lengths.

Transect	Point	GPS		Magnetic Azimuth	Length	Total Length
		E	N			
1	start	0423825	5012253	344	300	
	turn	0423822	5012345	29	300	
	end	0423892	5012403			600
2	start	0424276	5012479	174	400	
	end	0424257	5012357			400
3	start	0424313	5012509	n/a	n/a	Ocular
4	start	0424736	5012376	150	250	
	end	0424752	5012300			250
5	start	0424726	5012430	n/a	n/a	Ocular
6	start	0424989	5012148	360	300	
	end	0425015	5012235			300
7	start	0425269	5012593	344	300	
	end	0425267	5012676			300
8	start	0425249	5013191	1	300	
	end	0425279	5013274			300
9	start	0425240	5013414	198	300	
	end	0425205	5013332			300
10	start	0425146	5013589	n/a	n/a	Ocular
11	start	0425021	5013277	140	200	
	end	0425045	5013221			200
12	start	0425131	5013195	346	400	
	end	0425183	5013337			400

Figure 8. HEP transect locations on the Wallender parcel.

Table 9. Simonis parcel HEP transect UTM coordinates, magnetic azimuths, and lengths.

Transect	Point	GPS		Magnetic Azimuth	Length	Total Length
		E	N			
1	start	0425692	5011037	125	300	
	turn	n/a	n/a	n/a	300	
	turn	n/a	n/a	n/a	300	
	end	0425905	5010884			**900**
2	start	0426013	5010641	220	300	
	end	0425937	5010593			**300**
3	start	0425453	5010590	84	200	
	end	0425512	5010580			**200**
4	start	0425711	5011267	154	300	
	end	0425724	5011181			**300**
5	start	0425478	5011352	322	300	
	end	0425451	5011440			**300**
6	start	0425436	5011534	316	300	
	end	0425400	5011619			**300**
7	start	0425620	5011535	254	300	
	end	0425529	5011546			**300**
8	start	0425255	5010826	180	200	
	end	0425236	5010769			**200**
9	start	0424734	5011317	146	150	
	turn	0424746	5011275	64	150	
	end	0424793	5011266			**300**
10	start	0424901	5011324	160	200	
	turn	0424909	5011263	70	400	
	turn	0425031	5011267	56	300	
	end	0425116	5011306			**900**
11	start	0425049	5010980	308	300	
	turn	0424993	5011063	280	300	
	turn	0424911	5011107	308	300	
	end	0424859	5011179			**900**
12	start	0425355	5010767	111	300	
	end	0425426	5010710		300	**600**
13	start	0425354	5010812	66	200	
	end	0425412	5010827		200	**400**

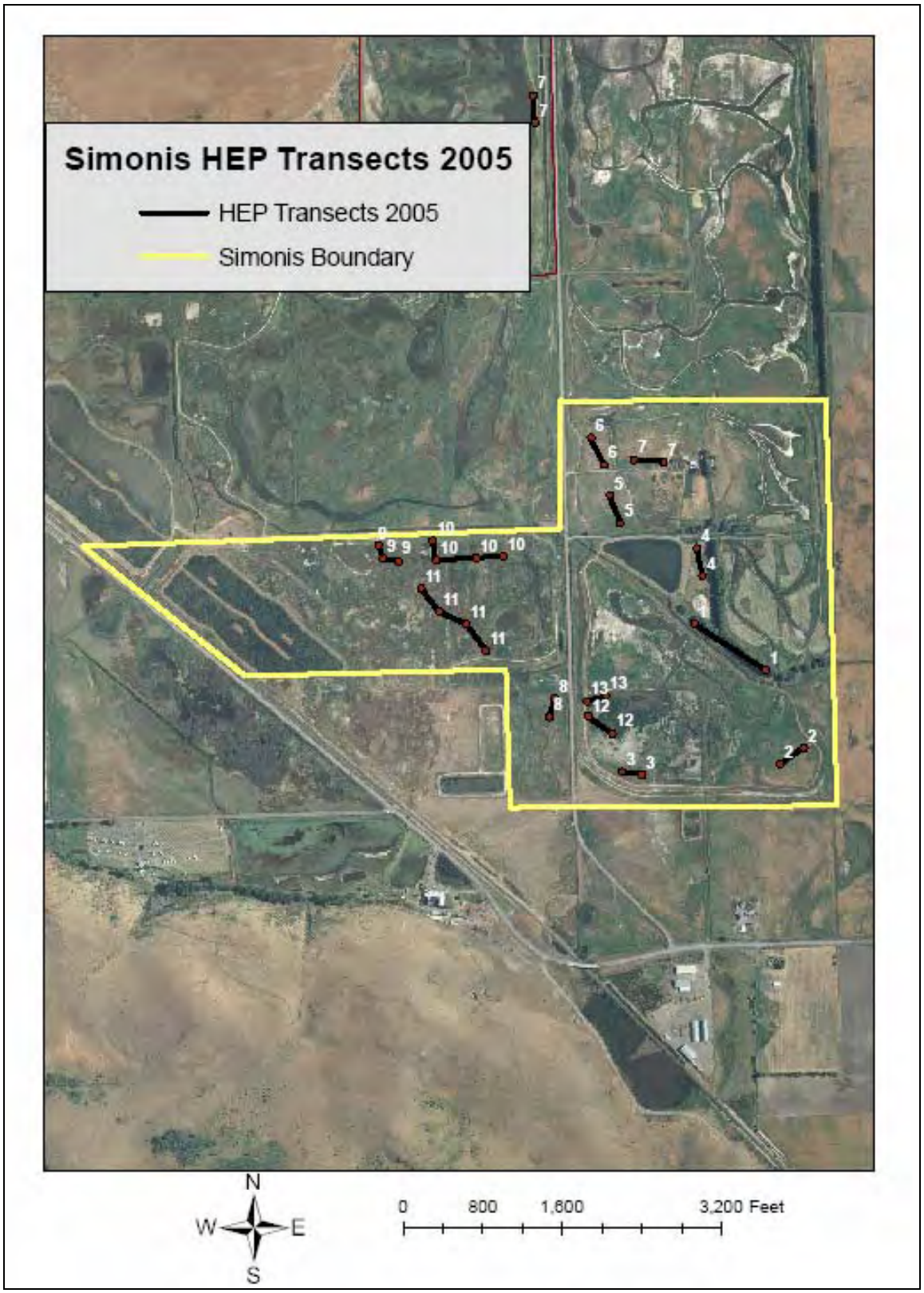

Figure 9. HEP transect locations on the Simonis parcel.

Table 10. North City parcel HEP transect UTM coordinates, magnetic azimuths, and lengths.

Transect	Point	GPS		Magnetic Azimuth	Length	Total Length
		E	N			
1	start	0425371	5014386	178	300	
	end	0425374	5014286			300
2	start	0425384	5013869	60	100	
	turn	0425414	5013877	102	100	
	turn	0425436	5013865	67	100	
	end	0425471	5013860			300

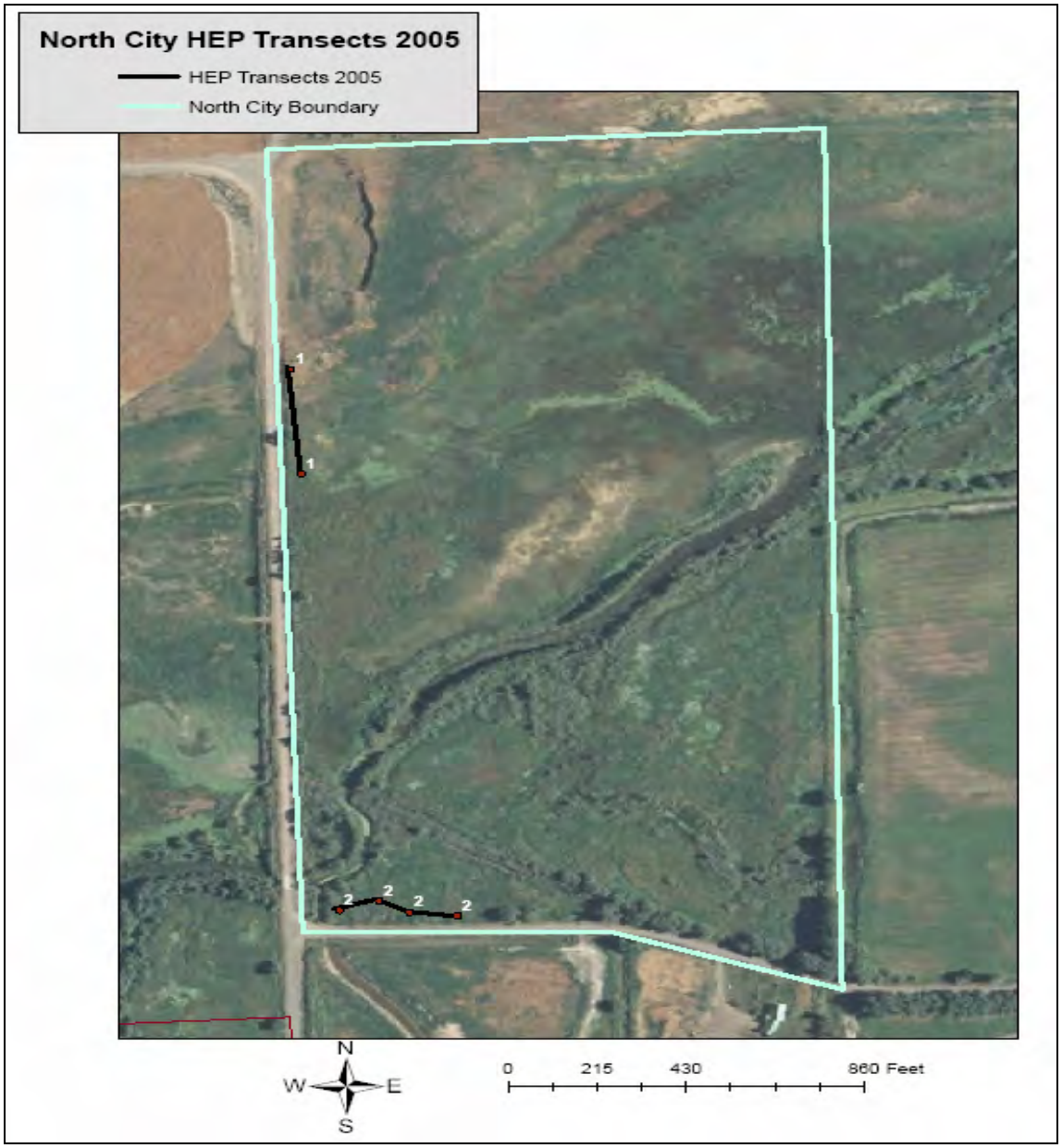

Figure 10. HEP transect locations on the North City parcel.

Table 11. Conley Lake HEP transect UTM coordinates, magnetic azimuths, and lengths.

Transect	Point	GPS		Magnetic Azimuth	Length	Total Length
		E	N			
1	start	429858	5022535	151	300	
	turn	429882	5022446	106	300	
	end	429961	5022399			600
2	start	429980	5022315	170	600	
	end	429987	5022138			600

Figure 11. HEP transect locations on the Conley Lake parcel.

RESULTS

The Ladd Marsh Wildlife Area HEP evaluation was completed by the Regional HEP Team and ODFW staff in May of 2005. The 2005 HEP assessment resulted in a total of 647.44 HUs, or 0.76 HUs/acre. This is an increase of 420.34 HUs (0.49 HUs/acre) over 2001 HEP survey results (Table 12). The most significant increases in HUs occurred on the Wallender and Simonis parcels which increased by 214.30 HUs and 177.49 HUs respectively. HEP survey results for individual parcels are compared and summarized below .

Table 12. Habitat units, HUs/acre, and differences between 2005 and 2001 HEP survey results.

Parcels	2005			2001			Differences	
	Project Acres[1]	HUs	HUs/Acre	Project Acres[1]	HUs[2]	HUs/Acre	HUs	HUs/Acre
Wallender	309.00	259.30	0.84	309.66	44.99	0.15	214.30	0.69
Simonis	308.00	271.89	0.88	313.23	94.40	0.30	177.49	0.58
North City	75.00	84.68	1.13	74.55	60.27	0.81	24.41	0.32
Conley Lake	161.00	31.56	0.20	161.07	27.44	0.17	4.13	0.03
Totals	**853.00**	**647.44**	**0.76**	**858.51**	**227.10**	**0.26**	**420.34**	**0.49**

[1] **Minute acreage differences are likely an artifact of GIS mapping.**

[2] **HU results vary slightly from those reported in the Ladd Marsh Wildlife Area Additions Mitigation Project Mitigation 2001 document due to "rounding" of the HSI scores.**

Wallender

A total of 259.79 HUs were generated on the Wallender parcel for an HU/acre ratio of 0.84:1(Table 13). The emergent wetland cover type contributed the largest share of the HUs produced on this project site i.e., 47% or 121.79 HUs. HEP transects were established on riparian scrub-shrub (n=1), riparian forest (n=1), grassland (n=2), emergent wetland (n=4), and open water (n=4) cover types.

Table 13. Wallender 2005/2001 HEP survey results and comparison.

Cover Type	Species	2005			2001			Difference		
		Acres	HSI	HUs	Acres	HSI	HUs	Acres	HSI	HUs
Riparian Forest[1]	Downy Woodpecker	1.00	1.00	1.00	0.00		0.00	1.00	1.00	1.00
	Song sparrow		0.00	0.00			0.00		0.00	0.00
	Yellow warbler		0.00	0.00			0.00		0.00	0.00
	California quail		0.34	0.34			0.00		0.34	0.34
	Ring-necked pheasant		0.13	0.13			0.00		0.13	0.13
Riparian Scrub-Shrub[1]	Yellow warbler	13.00	0.74	9.64	14.17	0.40	5.67	-1.17	0.34	3.97
	California quail		0.34	4.42		0.03	0.47		0.31	3.95
	Ring-necked pheasant		0.13	1.69		0.09	1.33		0.04	0.36
	Mule deer[2]		0.14	1.76			0.00		0.14	1.76
Emergent Wetland	Marsh wren	184.00	0.26	48.19	0.00		0.00	184.00	0.26	48.19
	Canada goose		0.40	73.60			0.00		0.40	73.60
Open Water	Mallard	42.00	0.78	32.58	0.00		0.00	42.00	0.78	32.58
Grassland	California quail	65.00	0.34	22.10	0.00		0.00	65.00	0.34	22.10
	Ring-necked pheasant		0.13	8.45			0.00		0.13	8.45
	Mule deer		0.13	8.53			0.00		0.13	8.53
	Western meadowlark		0.72	46.87			0.00		0.72	46.87
Agriculture	California quail	4.00	0.34	0.00	295.49	0.03	9.75	-291.49	0.31	-9.75
	Ring-necked pheasant		0.13	0.00		0.09	27.78		0.04	-27.78
Totals		**309.00**		**259.30**	**309.66**		**44.99**	**-0.66**		**214.30**

[1] **The riparian forest cover type was likely included in the riparian scrub-shrub for the 2001 surveys and was delineated separately in 2005. Minute acreage differences are likely an artifact of GIS mapping.**

[2] **These models were included in the Lower Snake River Loss Assessment matrix, but not applied in the 2001 HEP assessment.**

Simonis

HEP results show that 271.89 HUs were generated on the Simonis parcel for an HU/acre ratio of 0.88:1. The emergent wetland and grassland cover types contributed the most HUs at 147.28 and 100.06 HUs respectively (Table 14). Transects were established on riparian forest (n=1), riparian scrub-shrub (n=1), emergent wetland (n=5), open water (n=1), grassland (n=7), and agriculture (n=0) cover types.

Table 14. Simonis HSI/HU comparison between 2005 and 2001 HEP surveys.

Cover Type	Species	2005			2001			Difference		
		Acres	HSI	HUs	Acres	HSI	HUs	Acres	HSI	HUs
Riparian Forest[1]	Downy Woodpecker	8.00	0.50	4.00	0.00		0.00	8.00	0.50	4.00
	Song sparrow		0.77	6.20			0.00		0.77	6.20
	Yellow warbler		0.24	1.91			0.00		0.24	1.91
	California quail		0.34	2.72			0.00		0.34	2.72
	Ring-necked pheasant		0.13	1.04			0.00		0.13	1.04
Riparian Scrub-Shrub[1]	Yellow warbler	0.00		0.00	7.82	0.46	3.60	-7.82	-0.46	-3.60
	California quail			0.00		0.01	0.11		-0.01	-0.11
	Ring-necked pheasant			0.00		0.24	0.00		-0.24	0.00
	Mule deer[2]			0.00			0.00		0.00	0.00
Emergent Wetland	Marsh wren[2]	206.00	0.34	70.18	21.60		0.00	184.40	0.34	70.18
	Canada goose[3]		0.35	72.10			0.00		0.35	72.10
	Ring-necked pheasant			0.00		0.24	5.08		-0.24	-5.08
Open Water	Mallard	19.00	0.72	13.68	0.00		0.00	19.00	0.72	13.68
Grassland	California quail	71.00	0.34	24.14	0.00		0.00	71.00	0.34	24.14
	Ring-necked pheasant		0.13	9.23			0.00		0.13	9.23
	Mule deer		0.13	9.31			0.00		0.13	9.31
	Western meadowlark		0.81	57.39			0.00		0.81	57.39
Agriculture	California quail	0.00		0.00	279.81	0.01	3.92	-279.81	-0.01	-3.92
	Ring-necked pheasant			0.00		0.24	65.76		-0.24	-65.76
	Canada goose[4]			0.00	39.86	0.40	15.94		-0.40	-15.94
Residential	N/A	4.00		0.00	4.00		0.00	0.00	0.00	0.00
Totals		**308.00**		**271.89**	**313.23**		**94.40**	**-5.23**		**177.49**

[1] The riparian forest cover type was likely included in the riparian scrub-shrub for the 2001 surveys and was delineated separately in 2005. Minute acreage differences are likely an artifact of GIS mapping.

[2] These models were included in the Lower Snake River Loss Assessment matrix, but not applied in the 2001 HEP assessment.

[3] Canada goose model was substituted for the Ring-necked pheasant model (as per agreement with ODFW staff).

[4] 2001 HEP evaluators considered only 39.86 acres of the agriculture cover type as suitable habitat for Canada goose (the 39.86 acres is included in the 279.81 acres). The Canada goose model was not included in the Lower Snake River Loss Assessment matrix for this cover type.

North City

The North City parcel generated 84.68 habitat units and had the highest HU/acre ratio (1.13:1) of all Ladd Marsh parcels surveyed in 2005. The riparian shrub cover type yielded the highest number of HUs (37.21). HEP transects were established on riparian scrub-shrub (n=1), emergent wetland (n=1), and grassland (n=1) cover types (Table 15).

Table 15. North City parcel HSI/HU comparison between 2005 and 2001 HEP survey results.

Cover Type	Species	2005			2001			Difference		
		Acres	HSI	HUs	Acres	HSI	HUs	Acres	HSI	HUs
Riparian Shrub	Yellow warbler	19.00	0.55	10.39	18.53	0.81	15.01	0.47	-0.26	-4.62
	California quail		0.34	6.46		0.75	13.90		-0.41	-7.44
	Ring-necked pheasant		0.13	2.47		0.21	3.89		-0.08	-1.42
	Mule deer[1]		0.94	17.89			0.00		0.94	17.89
Emergent Wetland	Marsh wren[1]	39.00	0.22	8.42	39.42		0.00	-0.42	0.22	8.42
	Ring-necked pheasant[2]			0.00		0.21	8.28		-0.21	-8.28
	Canada goose[2,3]		0.35	13.65	10.86	0.30	3.26		0.05	10.39
Grassland	California quail	17.00	0.34	5.78	16.60	0.75	12.45	0.40	-0.41	-6.67
	Ring-necked pheasant		0.13	2.21		0.21	3.49		-0.08	-1.28
	Mule deer[1]		0.25	4.25			0.00		0.25	4.25
	Western meadowlark[1]		0.77	13.17			0.00		0.77	13.17
Totals		**75.00**		**84.68**	**74.55**		**60.27**	**0.45**		**24.41**

[1] These models were included in the Lower Snake River Loss Assessment matrix, but not applied in the 2001 HEP assessment.

[2] Canada goose model was substituted for the Ring-necked pheasant model (as per agreement with ODFW staff).

[3] 2001 HEP evaluators considered only 10.86 acres of the emergent wetland cover type as suitable habitat for Canada goose (the 10.86 acres is included in the 39.42 acres). The Canada goose model was not included in the Lower Snake River Loss Assessment matrix for this cover type.

Conley Lake

The Conley Lake parcel yielded the lowest HU/acre ratio (0.20:1) while generating 31.56 HUs. The grassland cover type contributed 17.26 HUs, or 54% of all HUs associated with this parcel (Table 16). Transects were established on emergent wetland (n=1) and grassland (n=1) cover types.

Table 16. Conley Lake parcel HSI/HU comparison between 2005 and 2001 HEP survey results.

Cover Type	Species	2005			2001 [1]			Difference		
		Acres	HSI	HUs	Acres[2]	HSI	HUs	Acres	HSI	HUs
Emergent Wetland	Marsh wren[3]	99.00	0.14	14.31	99.08		0.00	-0.08	0.14	14.31
	Canada goose[4]		0.00	0.00		[4]	[4]		0.00	0.00
	Ring-necked pheasant[5]					0.11	10.90		-0.11	-10.90
Grassland	California quail	62.00	0.00	0.00	0.00		0.00	62.00	0.00	0.00
	Ring-necked pheasant		0.08	4.96			0.00		0.08	4.96
	Mule deer		0.05	3.10			0.00		0.05	3.10
	Western meadowlark		0.15	9.20			0.00		0.15	9.20
Agriculture	California quail	0.00			61.99	0.00	0.00	-61.99	0.00	0.00
	Ring-necked pheasant					0.11	6.82		-0.11	-6.82
	Canada goose				14.95	0.65	9.72		-0.65	-9.72
Totals		**161.00**		**31.56**	**161.07**		**27.44**	**-0.07**		**4.13**

[1] Acres and Habitat Units reflect data provided in the Errata to the Ladd Marsh Wildlife Area Additions Mitigation Project document,

however it is unclear as to how the data was determined.

[2] Minute acreage differences are likely an artifact of GIS mapping.

[3] These models were included in the Lower Snake River Loss Assessment matrix, but not applied in the 2001 HEP assessment.
[4] Emergent Wetland and agriculture cover type acres are combined and listed under the agriculture cover type.

[5] Canada goose model was substituted for the Ring-necked pheasant model (as per agreement with ODFW staff).

DISCUSSION

Since 2001, significant changes in cover type acreage and/or structural conditions have occurred due to conversion of agriculture cover types to emergent wetland and grassland cover types. Agricultural lands were seeded to reestablish grasslands and wetlands were restored through active management and manipulation of extant water sources including natural stream hydrology/flood regimes and available irrigation. Today, agriculture lands (crop and grazed pasture) are nearly eliminated from Bonneville Power Administration mitigation project lands while grassland and wetland cover type acreage has increased significantly.

Limiting habitat variables and associated factors are shown by parcel in Tables 17, 18, 19, and 20 for HEP models that received a HSI < 0.40. The purpose of displaying the limiting variables in this manner is to identify the most limiting factors affecting the HSI values. It was assumed that habitat quality for HEP models with HSIs ≥ 0.40 was sufficient to support the target species at least at minimum population levels. Therefore, limiting variables and factors were not addressed for models with a HSI output ≥ 0.40. This does not suggest, however, that habitat quality should not be improved for these species.

Table 17. Wallender parcel 2005 HEP results and limiting HEP model variables and factors.

Cover Type	Acres	Species	HSI	Quality	Limiting Variables	Limiting Factors
Riparian Forest	1.00	Downy Woodpecker	1.00	Optimum	N/A	None, however, patch size limits likely limits use
		Song sparrow	0.00	Poor	V1: % shrub canopy cover	No shrubs present in this cover type.
					V2: Mean shrub height	No shrubs present in this cover type.
		Yellow warbler	0.00	Poor	V1: % deciduous shrub cover	No shrubs present in this cover type.
					V3: % shrubs comprised of hydrophytes	No shrubs present in this cover type.
		California quail	0.34	Marginal	Equivalent optimum area	Limited amount of roosting habitat
		Ring-necked pheasant	0.13	Poor	WTR FOOD V1: Pheasant winter food type	Optimum winter food types/acres limited
Riparian Shrub	13.00	Yellow warbler	0.74	Good	N/A	None
		California quail	0.34	Marginal	Equivalent optimum area	Limited amount of roosting habitat
		Ring-necked pheasant	0.13	Poor	WTR FOOD V1: Pheasant winter food type	Optimum winter food types/acres limited
		Mule deer	0.14	Poor	V1: % canopy cover of shrubs (< 5 ft in ht.)	Low % shrub canopy cover
					V3: % palatable herbaceous cover	Cover type dominated by reed canarygrass
Emergent Wetland	184.00	Marsh wren	0.26	Marginal	V2: % canopy cover of persistent/non-persistent vegetation.	Low % canopy cover of persistent/non-persistent vegetation.
		Canada goose	0.40	Fair	N/A	None
Open Water	42.00	Mallard	0.78	Good	N/A	None
Grassland	65.00	California quail	0.34	Marginal	Equivalent optimum area	Limited amount of roosting habitat
		Ring-necked pheasant	0.13	Poor	WTR FOOD V1: Pheasant winter food type	Optimum winter food types/acres limited
		Mule deer	0.13	Poor	V1: % shrub cover	Shrub cover lacking
					V2: % canopy cover of preferred shrubs	Shrub cover lacking
		Western meadowlark	0.72	Good	N/A	None

Table 18. Simonis property 2005 HEP results and limiting HEP model variables and factors.

Cover Type	Acres	Species	HSI	Quality	Limiting Variables	Limiting Factors
Riparian Forest	8.00	Downy Woodpecker	0.50	Fair	N/A	None
		Song sparrow	0.77	Good	N/A	None
		Yellow warbler	0.24	Marginal	V3: % deciduous canopy cover comprised of hydrophytic shrubs	Low hydrophytic shrub composition.
		California quail	0.34	Marginal	Equivalent optimum area	Limited amount of roosting habitat
		Ring-necked pheasant	0.13	Poor	WTR FOOD V1: Pheasant winter food type	Optimum winter food types/acres limited
Emergent Wetland	206.00	Marsh wren	0.34	Marginal	V1: Growth form of emergents	Marginal emergent growth forms due to high prevalence of reed canarygrass and/or lack of stiff vegetation
					V2: % canopy cover of persistent/non-persistent vegetation.	Low % canopy cover of persistent/non-persistent vegetation.
		Canada goose	0.35	Marginal	V1: Island nesting habitat	Island nesting habitat not present.
Open Water	19.00	Mallard	0.72	Good	N/A	None
Grassland	71.00	California quail	0.34	Marginal	Equivalent optimum area	Limited amount of roosting habitat
		Ring-necked pheasant	0.13	Poor	WTR FOOD V1: Pheasant winter food type	Optimum winter food types/acres limited
		Mule deer	0.13	Poor	V1: % shrub cover	Shrub cover lacking
					V2: % canopy cover of preferred shrubs	Shrub cover lacking
		Western meadowlark	0.81	Good	N/A	None

Table 19. North City parcel 2005 HEP results and limiting HEP model variables and factors.

Cover Type	Acres	Species	HSI	Quality	Limiting Variables	Limiting Factors
Riparian Shrub	19.00	Yellow warbler	0.55	Fair	N/A	None
		California quail	0.34	Marginal	Equivalent optimum area	Limited amount of roosting habitat
		Ring-necked pheasant	0.13	Poor	WTR FOOD V1: Pheasant winter food type	Optimum winter food types/acres limited
		Mule deer	0.94	Optimum	N/A	None
Emergent Wetland	39.00	Marsh wren	0.22	Marginal	V1: Growth form of emergents	Marginal emergent growth form due to presence of reed canary-grass and/or lack of stiff vegetation
					V2: % canopy cover of persistent/non-persistent vegetation	Low percent canopy cover of persistent/non-persistent vegetation.
		Canada goose	0.35	Marginal	V1: Island nesting habitat	Islands not present.
Grassland	17.00	California quail	0.34	Marginal	Equivalent optimum area	Limited amount of roosting habitat
		Ring-necked pheasant	0.13	Poor	WTR FOOD V1: Pheasant winter food type	Optimum winter food types/acres limited
					V1: % canopy cover of shrubs (< 5 ft in ht.)	Low % shrub canopy cover
		Mule deer	0.25	Marginal	V3: % palatable herbaceous cover	Cover type dominated by reed canarygrass.
		Western meadowlark	0.77	Good	N/A	None

Table 20. Conley Lake parcel 2005 HEP limiting variables and factors.

Cover Type	Acres	Species	HSI	Quality	Limiting Variables	Limiting Factors
Emergent Wetland	99.00	Marsh wren	0.14	Poor	V1: Growth form of emergents	Low % canopy cover of stiff emergent vegetation
					V2: % canopy cover of persistent/non-persistent vegetation	Low % canopy cover of persistent/non-persistent vegetation
		Canada goose	0.00	Poor	V1: Island nesting habitat	Islands absent
Grassland	62.00	California quail	0.00	Poor	All cover, roosting, and shrub variables	All habitat attributes extremely limited and/or absent
		Ring-necked pheasant	0.08	Poor	REPRO V2: Average herbaceous vegetation height	Short herbaceous vegetation height
		Mule deer	0.05	Poor	V1: % canopy cover of shrubs (< 5 ft in ht.)	No shrubs present
					V2: % canopy cover of preferred shrubs	No shrubs present
					V3: % palatable herbaceous cover	Low % cover of palatable herbaceous vegetation
		Western meadowlark	0.15	Poor	V1: % Herbaceous canopy	Low % herbaceous canopy cover
					V4: Distance to perch	Excessive distance to perch sites

ACKNOWLEDGEMENTS

I gratefully acknowledge the support of Cathy Nowak (ODFW) and LMWA staff for assistance with this analysis. The support and efforts of Regional HEP Team members including Sara Wagoner, Brandy Ellis, and Mike Wilkinson are also recognized and appreciated.

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APPENDIX A

Marsh Wren HSI Model

Library: D:LSNAKE.HLB
3-10-1990

Single covertype model.

el name: MARSH WREN

Verification level: Expert Review
Creation/modification date: 11-30-1989

GUTZWILLER, K. J., AND S. T. ANDERSON. 1987. HABITAT SUITABILITY INDEX MODELS: MARSH WREN. USFWS BIOL. REP. 82(10.139). 13 PP.

Covertypes:
PEM : Palustrine emergent wetland

```
Lev 4    Lev 3    Lev 2    Lev 1
GWTHEM---mnu------gem------prd--HSI
VCVEM01--grf-------!         :
WDPEM01--grf-------^         :
                   VCVTR07--grf-------^
```

Habitat variables:
GWTHEM : GROWTH FORM OF EMERGENT HYDROPHTES
VCVEM01 : % canopy cover of emergent herbaceous plants (pers. & non-pers.) (%)
VCVTR07 : % canopy cover of trees and shrubs (%)
WDPEM01 : Mean water depth under emergent vegetation during spring (cm,n)

MENU FUNCTION at level 3, position 1

Menu choice:	1	Output value:	1.000
Menu choice:	2	Output value:	0.500
Menu choice:	3	Output value:	0.100
Menu choice:	4	Output value:	0.000

GRAPH FUNCTION at level 3, position 2
Title: % CANOPY OF EMERGENT HERBACEOUS VEG (%)

X:	0.000,	Y:	0.000
X:	50.000,	Y:	0.100
X:	80.000,	Y:	1.000
X:	100.000,	Y:	1.000

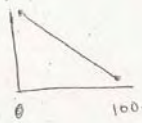
GRAPH FUNCTION at level 3, position 3
Title: MEAN WATER DEPTH (cm)

X:	0.000,	Y:	0.000
X:	15.000,	Y:	1.000
X:	40.000,	Y:	1.000

GRAPH FUNCTION at level 2, position 2

Title: % CANOPY COVER OF WOODY VEG (%)

X:	0.000,	Y:	1.000
X:	100.000,	Y:	0.000



Comments:
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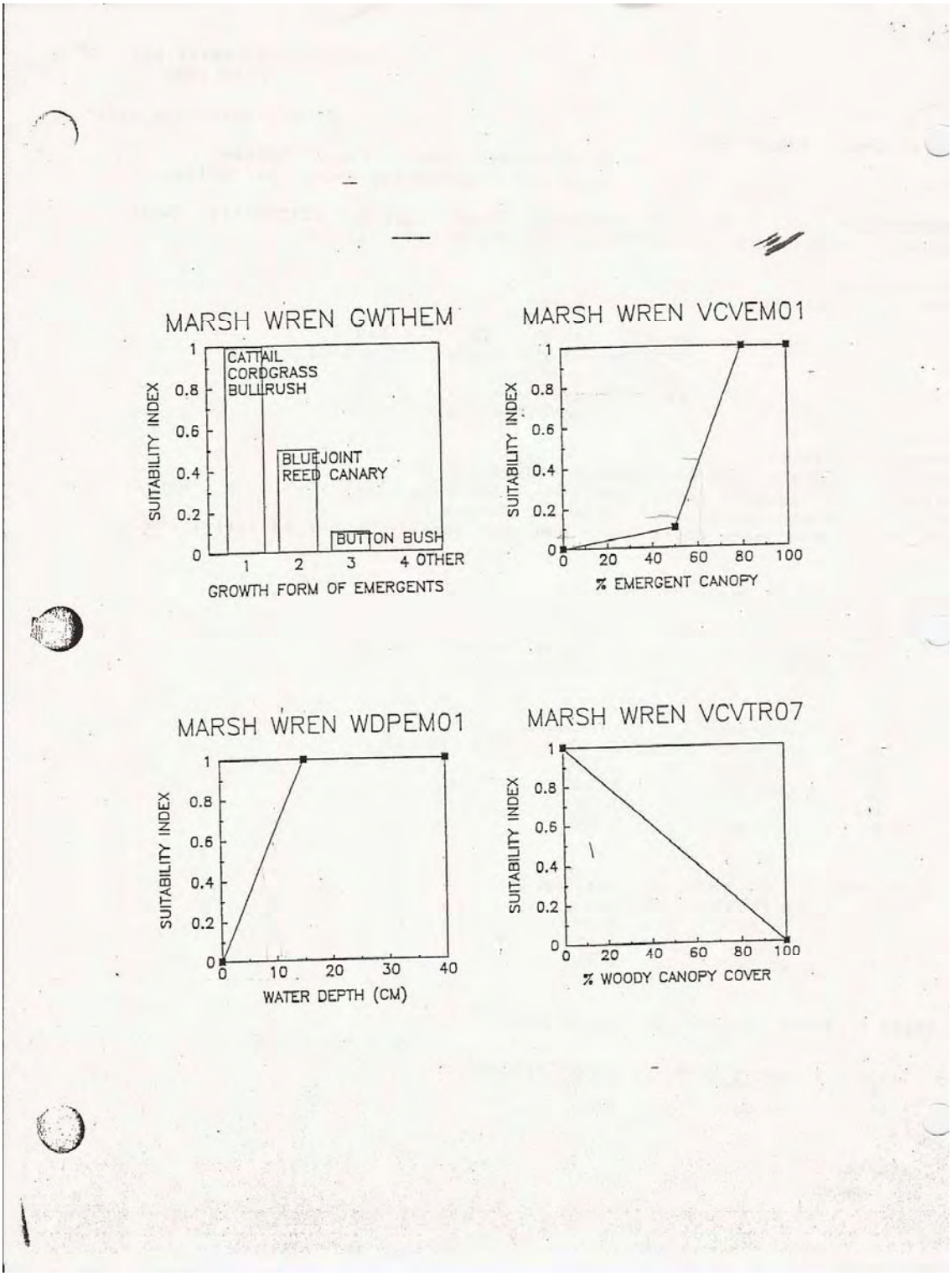

MARSH WREN GWTHEM
SUITABILITY INDEX
CATTAIL
CORDGRASS
BULLRUSH
BLUEJOINT
REED CANARY
BUTTON BUSH
1
2
3
4 OTHER
GROWTH FORM OF EMERGENTS
MARSH WREN VCVEM01
SUITABILITY INDEX
% EMERGENT CANOPY
MARSH WREN WDPEM01
SUITABILITY INDEX
WATER DEPTH (CM)
MARSH WREN VCVTR07
SUITABILITY INDEX
% WOODY CANOPY COVER

Yellow Warbler HSI Model

Library: D:LSNAKE.HLB
3-10-1990

Single covertype model.

Model name: YELLOW WARBLER
Verification level: EXPERT REVIEW
Creation/modification date: 3-5-1990

SCHROEDER, R.L. 1982. HABITAT SUITABILITY INDEX MODELS:
YELLOW WARBLER. U.S. FISH WILDL. SERV. BIOL. REP.
FWS/OBS-82/10.27. 7 PP.
Applies to breeding.
Range: throughout the breeding range of the species.

Covertypes:
PSS : Palustrine scrub/shrub wetland

```
                    Lev 3    Lev 2    Lev 1
                     VCVSH02--grf------usf--HSI
                     VHTSH05--grf-------¦
                     VRCSH01--grf-------^
```

Habitat variables:
VCVSH02 : Percent canopy cover of deciduous shrubs (i.e., <6m tall) (%) V1
VHTSH05 : Mean height of deciduous shrub canopy (not of individual shrubs) (m) V2
VRCSH01 : % of deciduous shrub canopy cover ; hydrophytic species (%) V3

.PH FUNCTION at level 2, position 1
Title: % DECIDUOUS SHRUB CROWN COVER

X:	0.000,	Y:	0.000
X:	60.000,	Y:	1.000
X:	80.000,	Y:	1.000
X:	100.000,	Y:	0.600

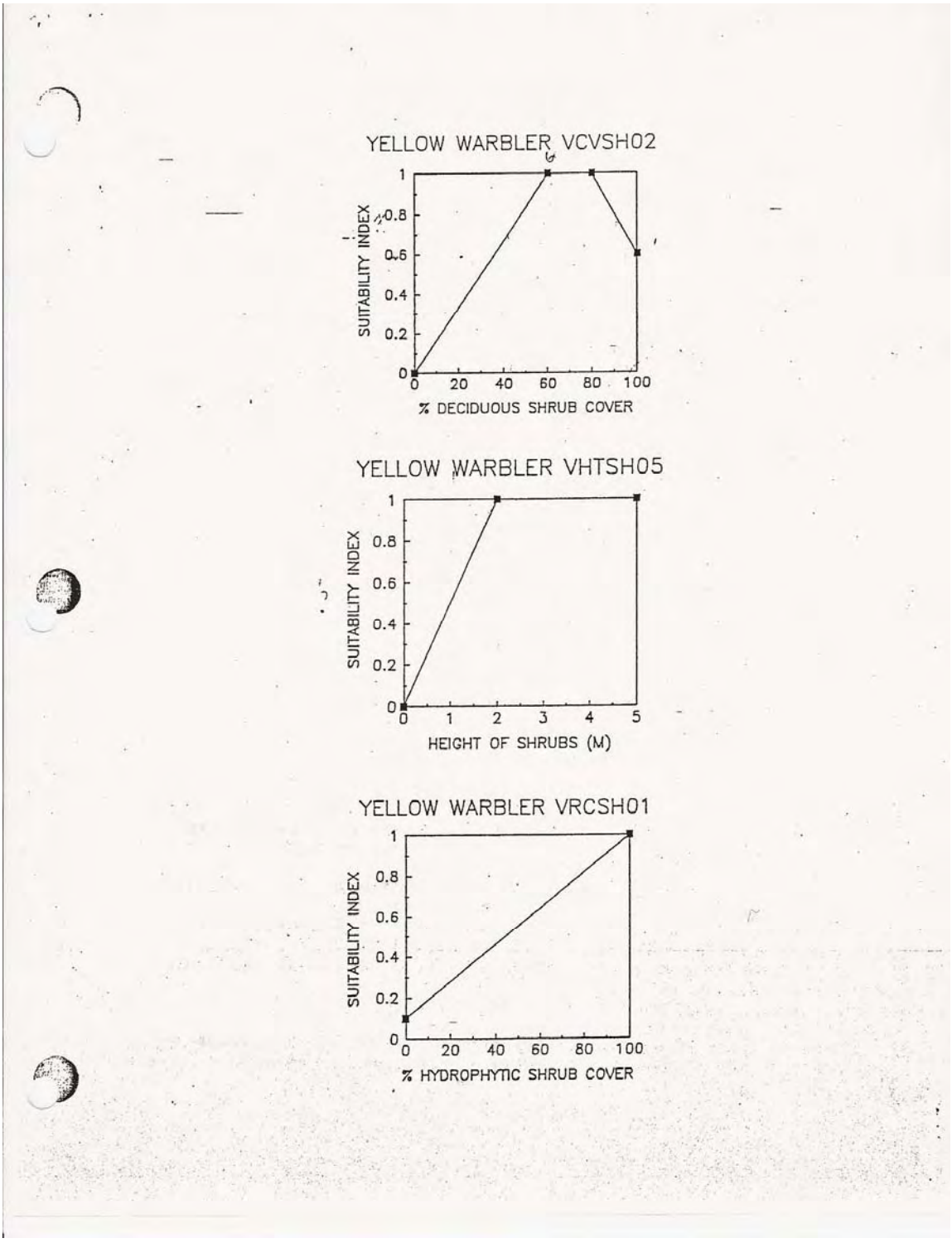
GRAPH FUNCTION at level 2, position 2
Title: AVERAGE HEIGHT OF SHRUB CANOPY (M)

X:	0.000,	Y:	0.000
X:	2.000,	Y:	1.000
X:	5.000,	Y:	1.000

GRAPH FUNCTION at level 2, position 3
Title: % SHRUB CANOPY COMPRISED OF HYDROPHYTIC SHRUBS

X:	0.000,	Y:	0.100
X:	100.000,	Y:	1.000

USER-SPECIFIED FUNCTION at level 1, position 1
USUB = (X(1)*X(2)*X(3))^.5


YELLOW WARBLER VCVSH02
SUITABILITY INDEX
1
0.8
0.6
0.4
0.2
0
0 20 40 60 80 100
% DECIDUOUS SHRUB COVER
YELLOW WARBLER VHTSH05
SUITABILITY INDEX
1
0.8
0.6
0.4
0.2
0
0 1 2 3 4 5
HEIGHT OF SHRUBS (M)
YELLOW WARBLER VRCSH01
SUITABILITY INDEX
1
0.8
0.6
0.4
0.2
0
0 20 40 60 80 100
% HYDROPHYTIC SHRUB COVER

Mule Deer HSI Model

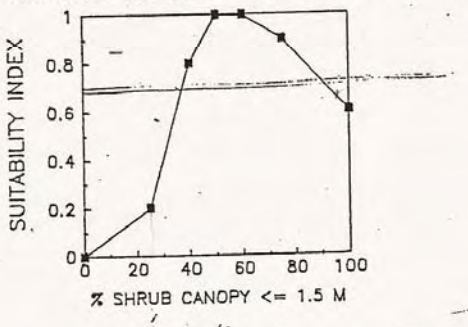
```
                                                    Library:  D:LSNAKE.HLB
                                                              3-10-1990

                                                          Single covertype model.

Model name:  MULE DEER
                                  Verification level:  Applied
                                  Creation/modification date:  10-18-1989

UNPUBLISHED MULE DEER MODEL USED FOR LOWER SNAKE RIVER PROJECT.

Covertypes:
UF      : Forbland
G       : GRASS
MS      : MESIC SHRUB
PFO     : Palustrine forested wetland
PSS     : Palustrine scrub/shrub wetland
SS      : SHRUBSTEPPE

                          Lev 3    Lev 2    Lev 1
                           VCVSH07--grf------usf--HSI
                           CVSH0P---grf-------|
                           VCVHE01--grf-------^

Habitat variables:
CVSH0P  : % CANOPY COVER OF SHRUBS PREFERRED BY DEER
VCVHE01 : Percent canopy cover of herbs (non-woody plants: grasses & forbs) (%
VCVSH07 : % canopy cover of shrubs that are < 2m tall (%)

GRAPH FUNCTION at level 2, position 1
  Title:  % SHRUB CANOPY COVER <= 1.5 M TALL
     X:       0.000,    Y:   0.000
     X:      25.000,    Y:   0.200
     X:      40.000,    Y:   0.800
     X:      50.000,    Y:   1.000
     X:      60.000,    Y:   1.000
     X:      75.000,    Y:   0.900
     X:     100.000,    Y:   0.600


GRAPH FUNCTION at level 2, position 2
  Title:  % CANOPY COVER OF SHRUBS PREF. BY DEER
     X:       0.000,    Y:   0.000
     X:      40.000,    Y:   1.000
     X:      60.000,    Y:   1.000
     X:     100.000,    Y:   0.600


GRAPH FUNCTION at level 2, position 3
  Title:  % HERBACEOUS CANOPY COVER
     X:       0.000,    Y:   0.000
```

X: 30.000, Y: 1.000
X: 100.000, Y: 1.000

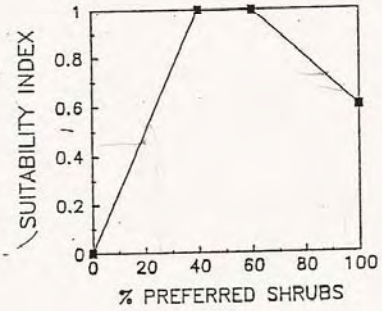
B-SPECIFIED FUNCTION at level 1, position 1
B = (3*(X(1)*X(2))^.5 + X(3))/4

Comments:
COVER PROVIDED BY TOPOGRAPHIC DIVERSITY IS ASSUMED TO BE NOT LIMITING FOR THE LOWER SNAKE RIVER APPLICATION OF THE MULE DEER MODEL.

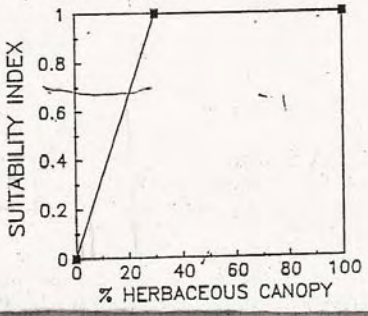
MULE DEER VCVSH07



MULE DEER CVSHOP



MULE DEER VCVHE01



Library: D:LSNAKE.HLB
3-10-1990

Multi-covertype model.

Model name: CALIFORNIA QUAIL
Verification level: None
Creation/modification date: 10-18-1989

DEVELOPED FOR LOWER SNAKE RIVER APPLICATION.

Covertypes:
AC : Cropland
G : GRASS
UF : Forbland
MS : MESIC SHRUB
SS : SHRUBSTEPPE
PSS : Palustrine scrub/shrub wetland
PFO : Palustrine forested wetland

LIFE REQUISITE: FOOD
Covertypes:
AC

Lev 3 Lev 2 Lev 1
DISTESC--grf------min-LRSI
DISTRST--grf-------^

Habitat variables:
DISTESC : DISTANCE TO ESCAPE COVER (M) V1
DISTRST : DISTANCE TO ROOST COVER (M) V2

GRAPH FUNCTION at level 2, position 1
Title: DISTANCE TO ESCAPE COVER (M)
X: 0.000, Y: 1.000
X: 50.000, Y: 1.000
X: 150.000, Y: 0.000
X: 1000.000, Y: 0.000

GRAPH FUNCTION at level 2, position 2
Title: DISTANCE TO C. QUAIL ROOST COVER
X: 0.000, Y: 1.000
X: 320.000, Y: 1.000
X: 480.000, Y: 0.000
X: 1000.000, Y: 0.000

Western Meadowlark HSI Model

Library: D:LSNAKE.HLB
3-10-1990

Single covertype model.

Model name: WESTERN MEADOWLARK
Verification level: Applied
Creation/modification date: 2-14-1989

SCHROEDER, R. L., AND P. J. SOUSA. 1982. HABITAT SUITABILITY INDEX MODELS: EASTERN MEADOWLARK. USFWS BIOL. REP. FWS/OBS-82/10.29. 9 PP.
(MODIFIED FOR WESTERN MEADOWLARK)

Covertypes:
G : GRASS
SS : SHRUBSTEPPE
UF : Forbland

Lev 3	Lev 2	Lev 1
VCVHE01	--grf------	usf--HSI
VRCGR01	--grf-------	!
VHTHE03	--grf-------	!
SDIPS01	--grf-------	!
VCVSH01	--grf-------	^

Habitat variables:
SDIPS01: Mean distance to a perch site (e.g. tall plant, post, wire) (m,n)
VHE01: Percent canopy cover of herbs (non-woody plants: grasses & forbs) (%)
VCVSH01: Percent canopy cover of shrubs (i.e., all woody plants <6m tall) (%)
VHTHE03: Mean height of herbaceous canopy during spring (cm)
VRCGR01: % of herbaceous canopy cover that is grasses (%)

GRAPH FUNCTION at level 2, position 1
Title: % HERBACEOUS CANOPY COVER

X:	0.000,	Y:	0.000
X:	25.000,	Y:	0.100
X:	50.000,	Y:	0.500
X:	65.000,	Y:	1.000
X:	100.000,	Y:	1.000

GRAPH FUNCTION at level 2, position 2
Title: % HERB CANOPY COVER THAT IS GRASS

X:	0.000,	Y:	0.000
X:	25.000,	Y:	0.100
X:	50.000,	Y:	0.500
X:	65.000,	Y:	1.000
X:	100.000,	Y:	1.000

GRAPH FUNCTION at level 2, position 3

Library: D:LSNAKE.HLB
3-10-1990

Single covertype model.

Model name: WESTERN MEADOWLARK
Verification level: Applied
Creation/modification date: 2-14-1989

SCHROEDER, R. L., AND P. J. SOUSA. 1982. HABITAT SUITABILITY INDEX MODELS: EASTERN MEADOWLARK. USFWS BIOL. REP. FWS/OBS-82/10.29. 9 PP.
(MODIFIED FOR WESTERN MEADOWLARK)

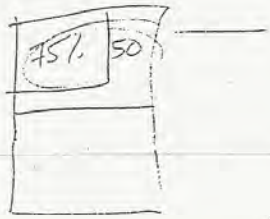
Covertypes:
G : GRASS
SS : SHRUBSTEPPE
UF : Forbland

```
Lev 3     Lev 2     Lev 1
 VCVHE01--grf------usf--HSI
 VRCGR01--grf-------!
 VHTHE03--grf-------!
 SDIPS01--grf-------!
 VCVSH01--grf-------^
```

Habitat variables:
SDIPS01: Mean distance to a perch site (e.g. tall plant, post, wire) (m,n)
VHE01: Percent canopy cover of herbs (non-woody plants: grasses & forbs) (%)
VCVSH01: Percent canopy cover of shrubs (i.e., all woody plants <6m tall) (%)
VHTHE03: Mean height of herbaceous canopy during spring (cm)
VRCGR01: % of herbaceous canopy cover that is grasses (%)

GRAPH FUNCTION at level 2, position 1
Title: % HERBACEOUS CANOPY COVER

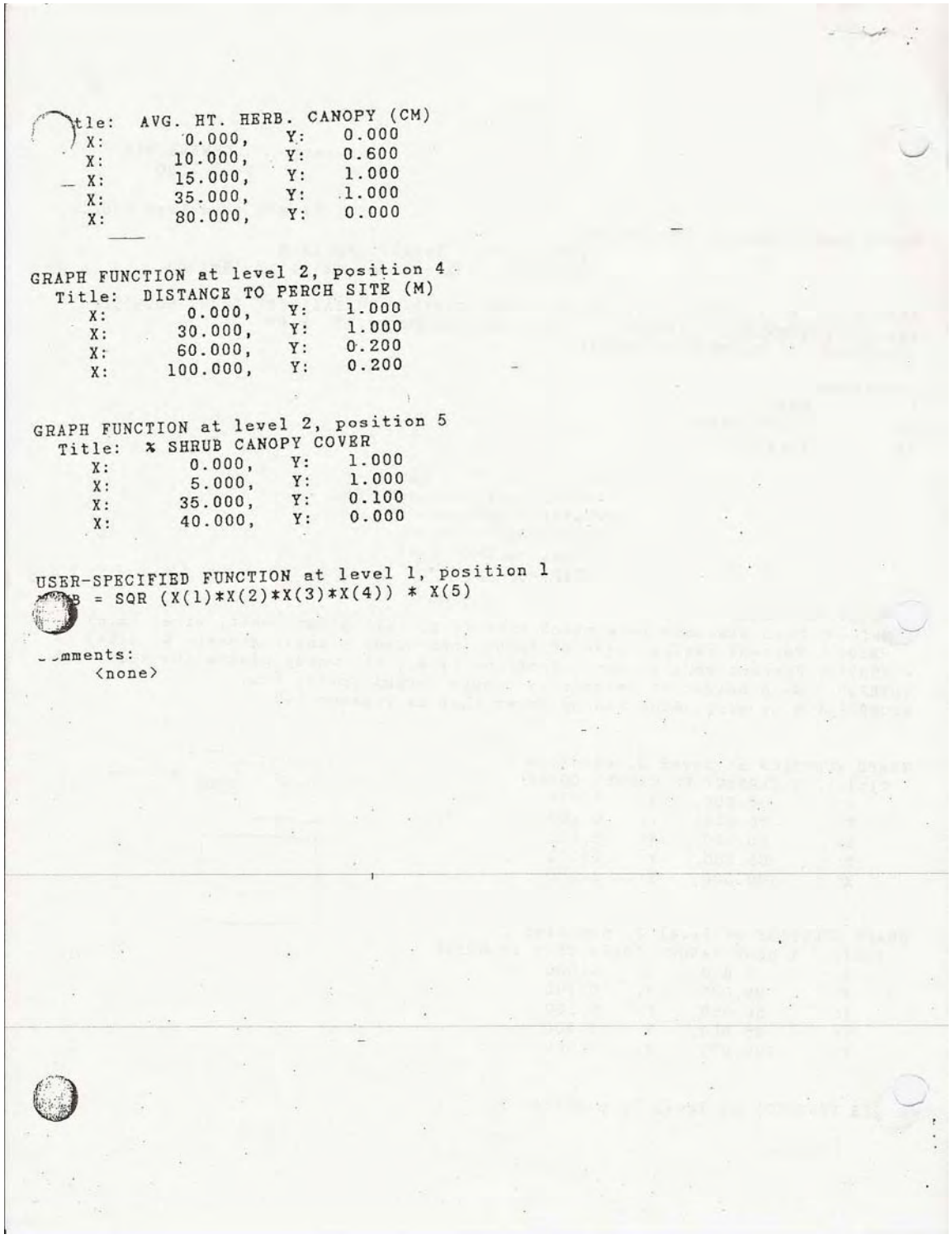
X:	0.000,	Y:	0.000
X:	25.000,	Y:	0.100
X:	50.000,	Y:	0.500
X:	65.000,	Y:	1.000
X:	100.000,	Y:	1.000



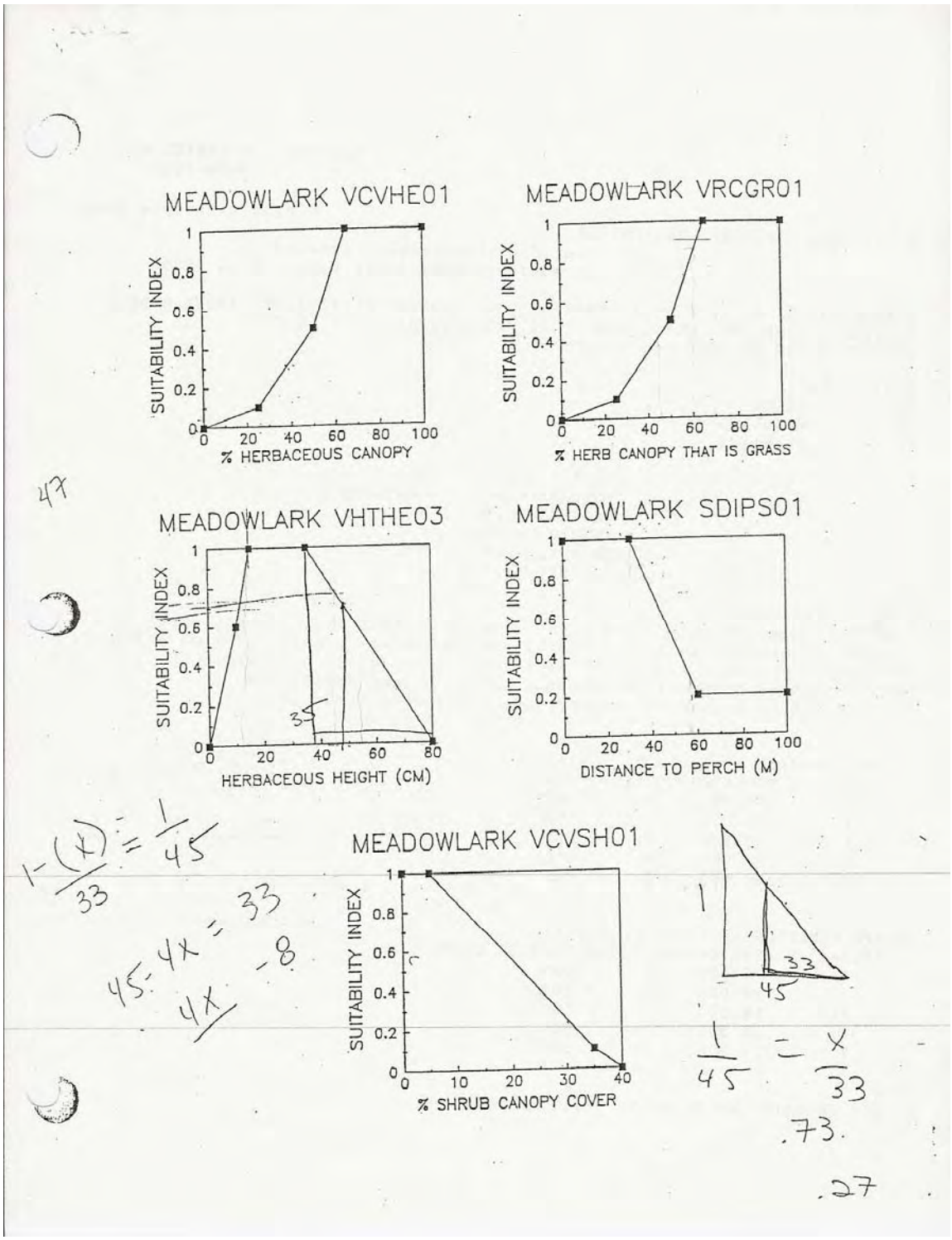
GRAPH FUNCTION at level 2, position 2
Title: % HERB CANOPY COVER THAT IS GRASS

X:	0.000,	Y:	0.000
X:	25.000,	Y:	0.100
X:	50.000,	Y:	0.500
X:	65.000,	Y:	1.000
X:	100.000,	Y:	1.000

GRAPH FUNCTION at level 2, position 3



```
Title:  AVG. HT. HERB. CANOPY (CM)
   X:       0.000,    Y:    0.000
   X:      10.000,    Y:    0.600
   X:      15.000,    Y:    1.000
   X:      35.000,    Y:    1.000
   X:      80.000,    Y:    0.000

GRAPH FUNCTION at level 2, position 4
  Title:  DISTANCE TO PERCH SITE (M)
     X:       0.000,    Y:    1.000
     X:      30.000,    Y:    1.000
     X:      60.000,    Y:    0.200
     X:     100.000,    Y:    0.200

GRAPH FUNCTION at level 2, position 5
  Title:  % SHRUB CANOPY COVER
     X:       0.000,    Y:    1.000
     X:       5.000,    Y:    1.000
     X:      35.000,    Y:    0.100
     X:      40.000,    Y:    0.000

USER-SPECIFIED FUNCTION at level 1, position 1
   = SQR (X(1)*X(2)*X(3)*X(4)) * X(5)

Comments:
     <none>
```


MEADOWLARK VCVHE01
SUITABILITY INDEX
% HERBACEOUS CANOPY
MEADOWLARK VRCGR01
SUITABILITY INDEX
% HERB CANOPY THAT IS GRASS
MEADOWLARK VHTHE03
SUITABILITY INDEX
HERBACEOUS HEIGHT (CM)
MEADOWLARK SDIPS01
SUITABILITY INDEX
DISTANCE TO PERCH (M)
MEADOWLARK VCVSH01
SUITABILITY INDEX
% SHRUB CANOPY COVER
1-(x)/33 = 1/45
45-4x = 33
-8
4x
1/45 = x/33
.73
.27

California Quail HSI Model

```
                                                    Library:   D:LSNAKE.HLB
                                                               3-10-1990

                                                         Multi-covertype model.
Model name:  CALIFORNIA QUAIL
                                Verification level:  None
                                Creation/modification date:  10-18-1989

DEVELOPED FOR LOWER SNAKE RIVER APPLICATION.

Covertypes:
AC      : Cropland
G       : GRASS
UF      : Forbland
MS      : MESIC SHRUB
SS      : SHRUBSTEPPE
PSS     : Palustrine scrub/shrub wetland
PFO     : Palustrine forested wetland


------------------------------------------------------------------------------
LIFE REQUISITE:  FOOD
Covertypes:
    AC

                          Lev 3    Lev 2    Lev 1
                           DISTESC--grf------min-LRSI
                           DISTRST--grf-------^

Habitat variables:
DISTESC : DISTANCE TO ESCAPE COVER (M)
DISTRST : DISTANCE TO ROOST COVER (M)

GRAPH FUNCTION at level 2, position 1
  Title:  DISTANCE TO ESCAPE COVER (M)
    X:       0.000,    Y:   1.000
    X:      50.000,    Y:   1.000
    X:     150.000,    Y:   0.000
    X:    1000.000,    Y:   0.000

GRAPH FUNCTION at level 2, position 2
  Title:  DISTANCE TO C. QUAIL ROOST COVER
    X:       0.000,    Y:   1.000
    X:     320.000,    Y:   1.000
    X:     480.000,    Y:   0.000
    X:    1000.000,    Y:   0.000
```

Comments:
CROP TYPES ASSUMED TO PROVIDE OPTIMAL FOOD.

LIFE REQUISITE: FOOD 2
Covertypes:
G, UF, MS, SS, PSS, PFO

```
                        Lev 3     Lev 2     Lev 1
                         VCVHE01--grf------usf-LRSI
                         DISTRST--grf-------!
                         DISTESC--grf-------^
```

Habitat variables:
DISTESC : DISTANCE TO ESCAPE COVER (M)
DISTRST : DISTANCE TO ROOST COVER (M)
VCVHE01 : Percent canopy cover of herbs (non-woody plants: grasses & forbs) (%

GRAPH FUNCTION at level 2, position 1
Title: % HERBACEOUS CANOPY COVER (%)

X:	0.000,	Y:	0.000
X:	25.000,	Y:	1.000
X:	75.000,	Y:	1.000
X:	100.000,	Y:	0.200

GRAPH FUNCTION at level 2, position 2
Title: DISTANCE TO C. QUAIL ROOST COVER (M)

X:	0.000,	Y:	1.000
X:	320.000,	Y:	1.000
X:	480.000,	Y:	0.000
X:	1000.000,	Y:	0.000

GRAPH FUNCTION at level 2, position 3
Title: DISTANCE TO C. QUAIL ESCAPE CVR (M)

X:	0.000,	Y:	1.000
X:	50.000,	Y:	1.000
X:	150.000,	Y:	0.000
X:	1000.000,	Y:	0.000

USER-SPECIFIED FUNCTION at level 1, position 1
USUB = X(1)*0.75
IF X(2) < X(3) THEN USUB = USUB*X(2)
IF X(3) <= X(2) THEN USUB = USUB*X(3)

Equation for Food 2

Comments:
<none>

LIFE REQUISITE: ESC CVR
Covertypes:
G, UF, MS, PSS, PFO, SS

```
Lev 5     Lev 4     Lev 3     Lev 2     Lev 1
VCVHE01--grf------gem------max------prd-LRSI
VHTHE01--grf-------^          !          :
VCVSH01--grf------gem--------^           :
VHTSH01--grf-------^                     :
                          DISTRST--grf---^
```

Habitat variables:
DISTRST : DISTANCE TO ROOST COVER (M) - V5
VCVHE01 : Percent canopy cover of herbs (non-woody plants: grasses & forbs) (%) V1
VCVSH01 : Percent canopy cover of shrubs (i.e., all woody plants <6m tall) (%) V3
VHTHE01 : Mean height of herbaceous canopy (not of individual plants) (cm) V2
VHTSH01 : Mean height of shrubs (i.e., woody plants < 6m tall) (%) V4

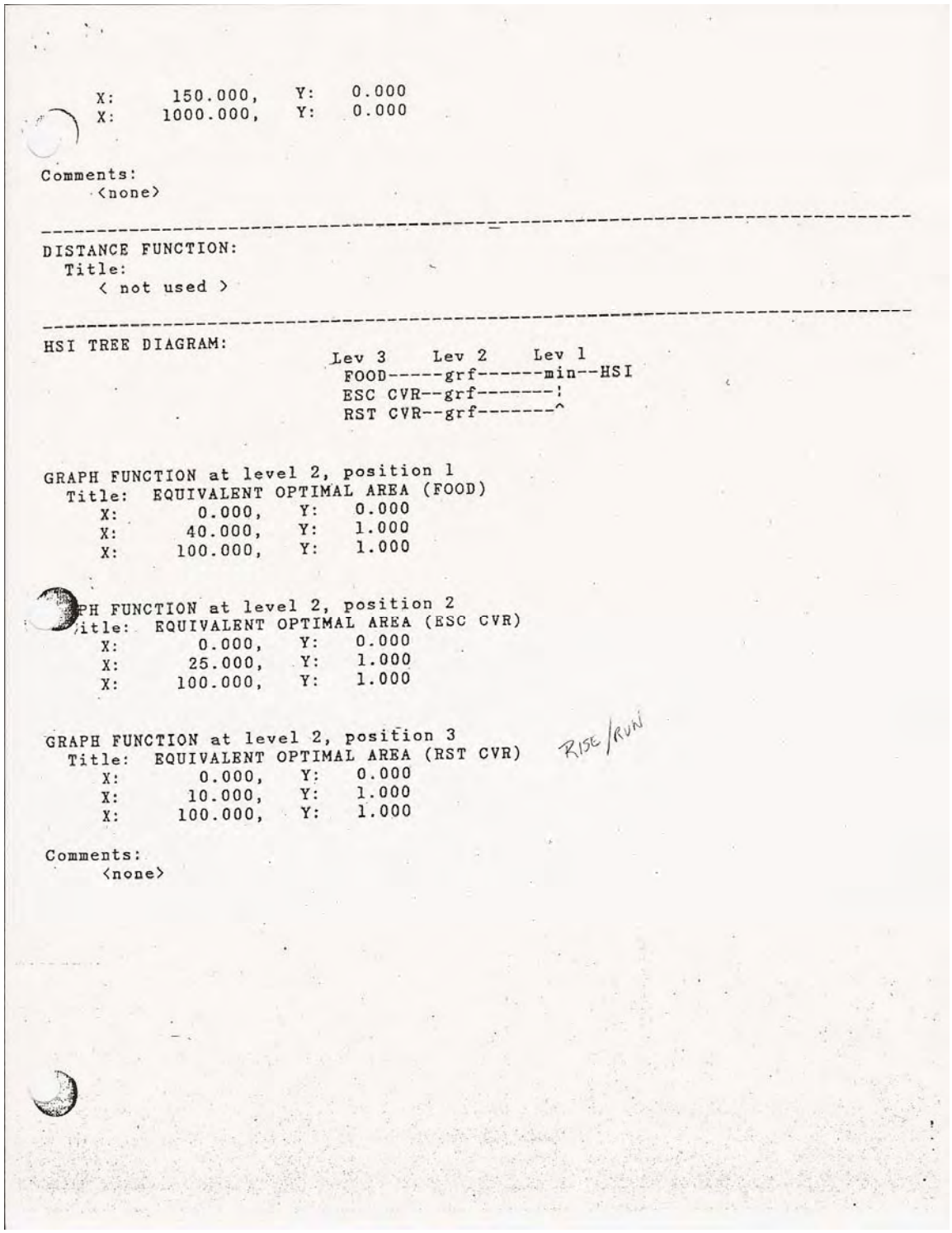
GRAPH FUNCTION at level 4, position 1
Title: % HERB CANOPY COVER (ESC CVR)
X: 0.000, Y: 0.000
X: 50.000, Y: 1.000
X: 100.000, Y: 1.000

GRAPH FUNCTION at level 4, position 2
Title: AVG. HT HERB VEGETATION (ESC CVR) (CM)
X: 0.000, Y: 0.000
X: 30.000, Y: 0.000
X: 61.000, Y: 1.000
X: 200.000, Y: 1.000

GRAPH FUNCTION at level 4, position 3
Title: % SHRUB CANOPY COVER
X: 0.000, Y: 0.000
X: 20.000, Y: 1.000
X: 100.000, Y: 1.000

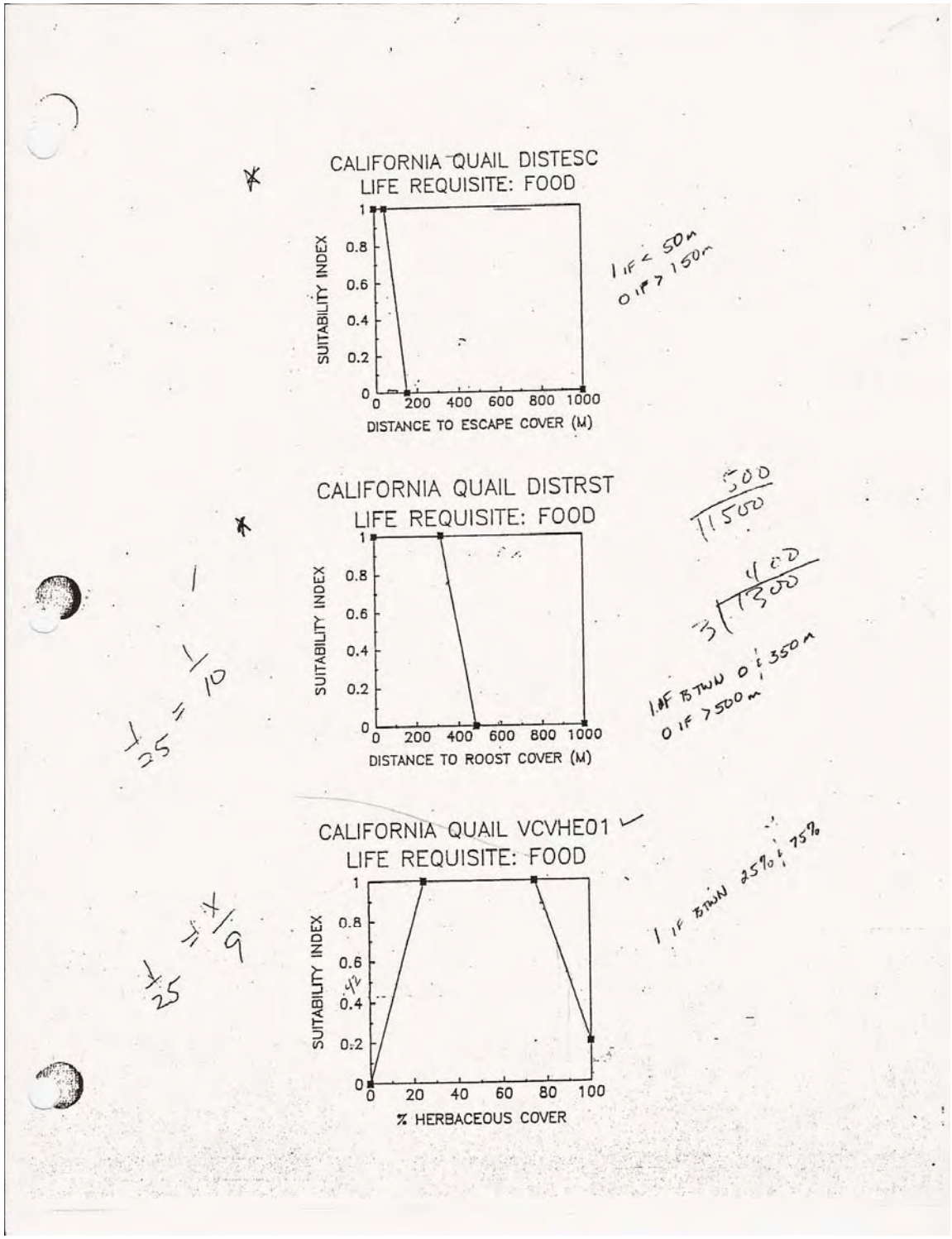
GRAPH FUNCTION at level 4, position 4
Title: AVG SHRUB HT (M)
X: 0.000, Y: 0.000
X: 1.000, Y: 1.000

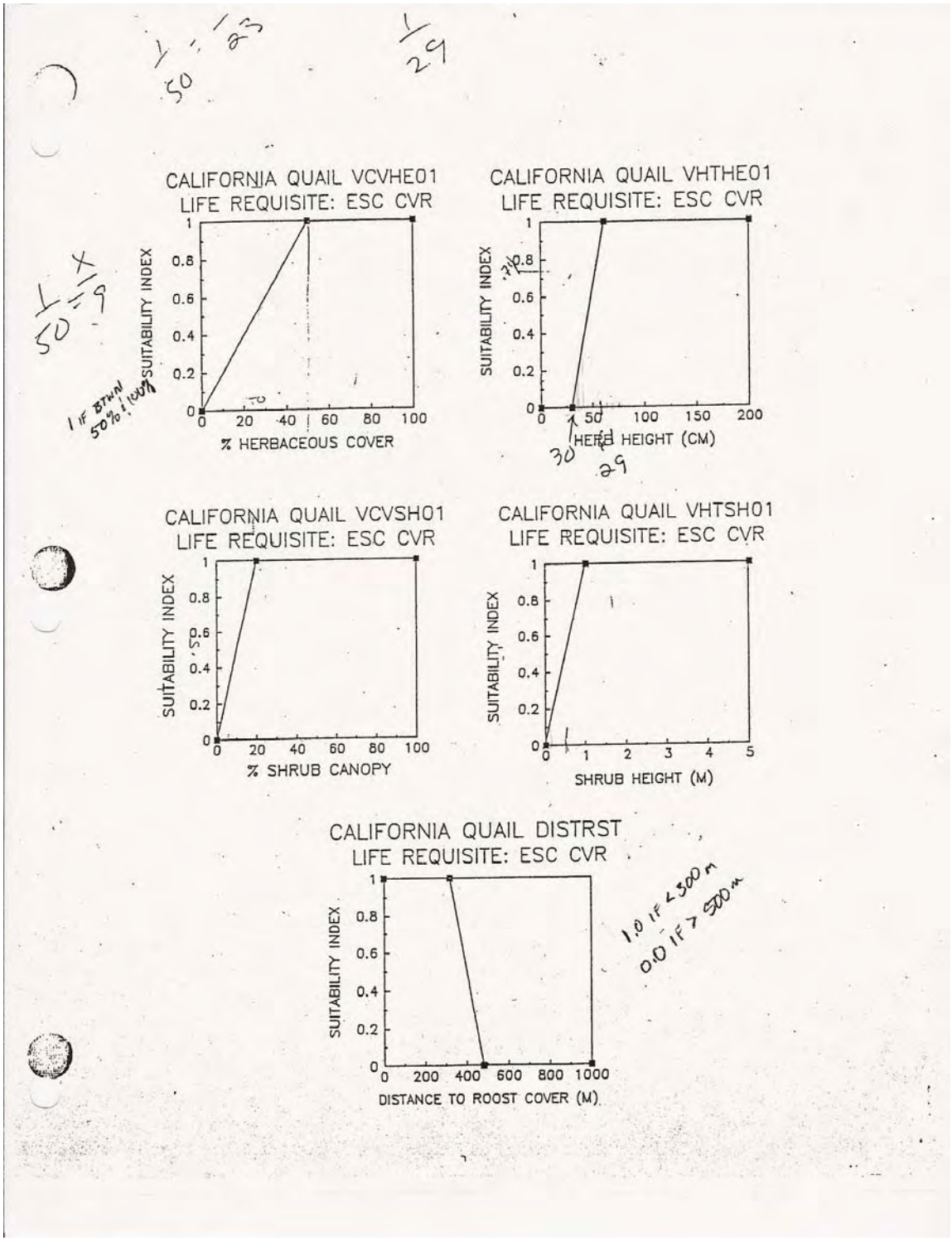
```
    X:        5.000,    Y:    1.000

PH FUNCTION at level 2, position 2
  Title:  DISTANCE TO C. QUAIL ROOST CVR (M)
    X:        0.000,    Y:    1.000
    X:      320.000,    Y:    1.000
    X:      480.000,    Y:    0.000
    X:     1000.000,    Y:    0.000


Comments:
     <none>


-------------------------------------------------------------------------------
LIFE REQUISITE:  WTR RST
Covertypes:
    MS, PSS, PFO, SS
    /  /   /   /

                    Lev 4    Lev 3    Lev 2    Lev 1
                     VCVSH01--grf------gem------prd-LRSI
                     VHTSH01--grf-------^        :
                              DISTESC--grf-------^

tat variables:
TESC : DISTANCE TO ESCAPE COVER (M)
VSH01 : Percent canopy cover of shrubs (i.e., all woody plants <6m tall) (%)
VHTSH01 : Mean height of shrubs (i.e., woody plants < 6m tall) (%)

GRAPH FUNCTION at level 3, position 1
  Title:  % SHRUB CANOPY COVER
    X:        0.000,    Y:    0.000
    X:       20.000,    Y:    1.000
    X:      100.000,    Y:    1.000


GRAPH FUNCTION at level 3, position 2
  Title:  AVG SHRUB HT (M)
    X:        0.000,    Y:    0.000
    X:        1.000,    Y:    0.200
    X:        1.500,    Y:    1.000
    X:        5.000,    Y:    1.000


GRAPH FUNCTION at level 2, position 2
  Title:  DISTANCE TO C. QUAIL ESCAPE CVR (M)
    X:        0.000,    Y:    1.000
    X:       50.000,    Y:    1.000
```

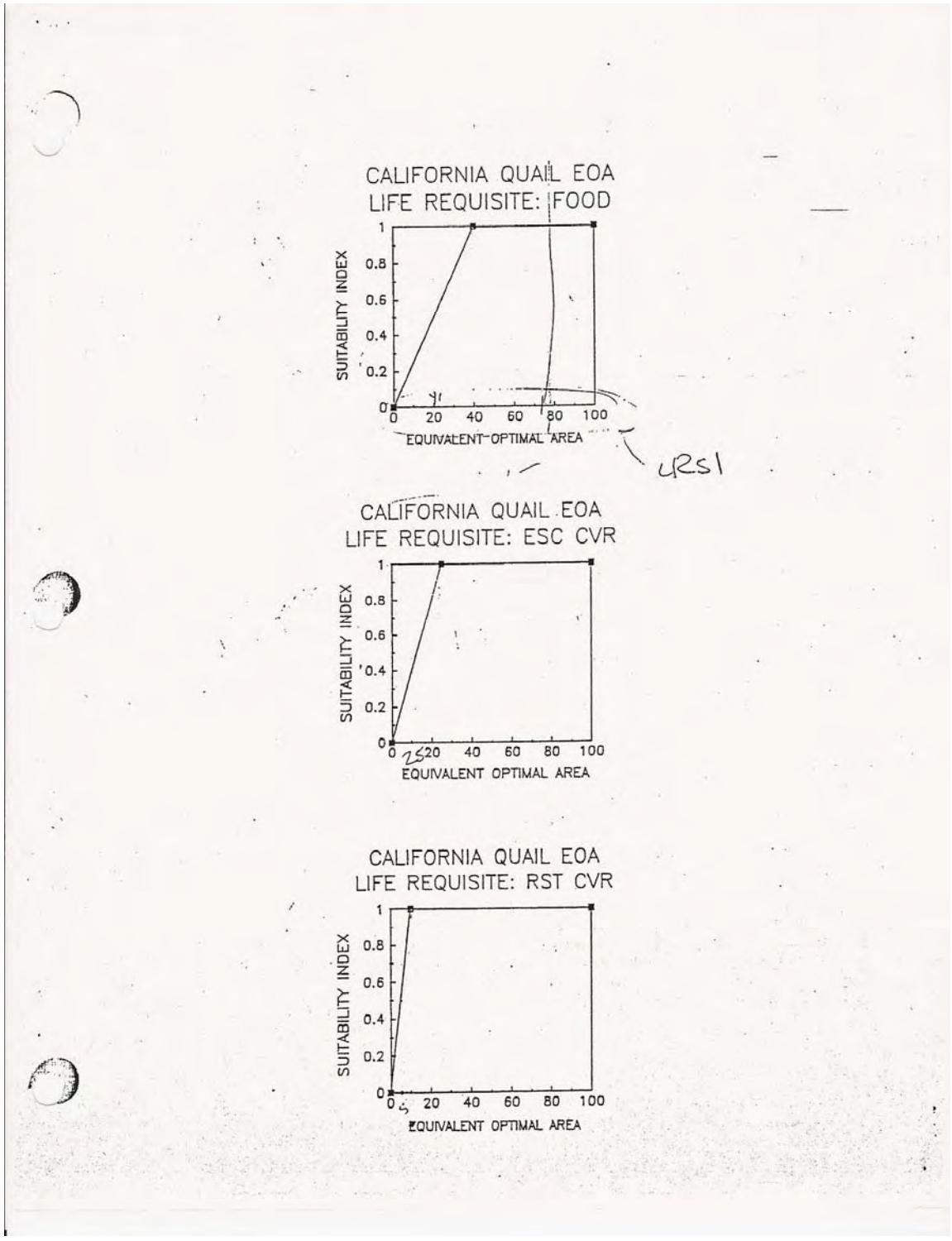


```
      X:      150.000,    Y:    0.000
      X:     1000.000,    Y:    0.000

Comments:
     <none>

-------------------------------------------------------------------------------
DISTANCE FUNCTION:
  Title:
     < not used >

-------------------------------------------------------------------------------
HSI TREE DIAGRAM:
                          Lev 3    Lev 2    Lev 1
                           FOOD-----grf------min--HSI
                           ESC CVR--grf-------!
                           RST CVR--grf-------^


GRAPH FUNCTION at level 2, position 1
  Title:  EQUIVALENT OPTIMAL AREA (FOOD)
      X:        0.000,    Y:    0.000
      X:       40.000,    Y:    1.000
      X:      100.000,    Y:    1.000

GRAPH FUNCTION at level 2, position 2
  Title:  EQUIVALENT OPTIMAL AREA (ESC CVR)
      X:        0.000,    Y:    0.000
      X:       25.000,    Y:    1.000
      X:      100.000,    Y:    1.000

GRAPH FUNCTION at level 2, position 3
  Title:  EQUIVALENT OPTIMAL AREA (RST CVR)
      X:        0.000,    Y:    0.000
      X:       10.000,    Y:    1.000
      X:      100.000,    Y:    1.000

Comments:
     <none>
```

RISE/RUN


CALIFORNIA QUAIL DISTESC
LIFE REQUISITE: FOOD
SUITABILITY INDEX
DISTANCE TO ESCAPE COVER (M)
1 IF < 50m
0 IF > 150m
CALIFORNIA QUAIL DISTRST
LIFE REQUISITE: FOOD
SUITABILITY INDEX
DISTANCE TO ROOST COVER (M)
1 IF BTWN 0 & 350m
0 IF > 500m
CALIFORNIA QUAIL VCVHE01
LIFE REQUISITE: FOOD
SUITABILITY INDEX
% HERBACEOUS COVER
1 IF BTWN 25% & 75%


CALIFORNIA QUAIL VCVHE01
LIFE REQUISITE: ESC CVR
SUITABILITY INDEX
% HERBACEOUS COVER
CALIFORNIA QUAIL VHTHE01
LIFE REQUISITE: ESC CVR
SUITABILITY INDEX
HERB HEIGHT (CM)
CALIFORNIA QUAIL VCVSH01
LIFE REQUISITE: ESC CVR
SUITABILITY INDEX
% SHRUB CANOPY
CALIFORNIA QUAIL VHTSH01
LIFE REQUISITE: ESC CVR
SUITABILITY INDEX
SHRUB HEIGHT (M)
CALIFORNIA QUAIL DISTRST
LIFE REQUISITE: ESC CVR
SUITABILITY INDEX
DISTANCE TO ROOST COVER (M)


CALIFORNIA QUAIL EOA
LIFE REQUISITE: FOOD
SUITABILITY INDEX
1
0.8
0.6
0.4
0.2
0
0 20 40 60 80 100
EQUIVALENT OPTIMAL AREA
CALIFORNIA QUAIL EOA
LIFE REQUISITE: ESC CVR
SUITABILITY INDEX
1
0.8
0.6
0.4
0.2
0
0 20 40 60 80 100
EQUIVALENT OPTIMAL AREA
CALIFORNIA QUAIL EOA
LIFE REQUISITE: RST CVR
SUITABILITY INDEX
1
0.8
0.6
0.4
0.2
0
0 20 40 60 80 100
EQUIVALENT OPTIMAL AREA

CALIFORNIA QUAIL

LRSI (FOOD 1) = Min. / SI DISTESC
                    \ SI DISTRST

= Min. / V1
       \ V2

LRSI (FOOD 2) = (SI VCVHE01 X .75) X Min. / SI DISTRST
                                          \ SI DISTESC

= (V1 X .75) X Min. / V2
                    \ V3

LRSI (ESC.CVR.) = SI DISTRST X Max. / (SI VCVHE01 X SI VHTHE01)$^{1/2}$
                                    \ (SI VCVSH01 X SI VHTSH01)$^{1/2}$

= V5 X Max. / (V1 X V2)$^{1/2}$
            \ (V3 X V4)$^{1/2}$

LRSI (WTR.RST) = (SI VCVSH01 X SI VHTSH01)$^{1/2}$ X SI DISTESC

= (V1 X V2)$^{1/2}$ X V3

COVER TYPE ACREAGE / TOTAL ACRES = RELATIVE AREA

SUM(RELATIVE AREA X HSI) = LR EOA

OVERALL HSI = Min. / LR FOOD EOA
                  - LR ESC CVR EOA
                  \ LR WTR RST EOA

Canada Goose HSI Model

Library: D:LSNAKE.HLB
3-23-1990

Single covertype model.

Model name: CANADA GOOSE

Verification level: Applied
Creation/modification date: 1-5-1990

USFWS. 1985. WILDLIFE IMPACT ASSESSMENT, PALISADES PROJECT,
CANADA GOOSE HSI MODEL. (MODIFIED FOR LOWER SNAKE RIVER PROJECT)

Covertypes:
SHOR100 :HABITAT BAND 100M WIDE X LENGTH OF RES. + ISLANDS, ALL COVER TYPES INC

```
                    Lev 3     Lev 2     Lev 1
                     ISL1-----grf------min--HSI
                     BRHAB----grf-------^
```

Habitat variables:
BRHAB : BROOD-REARING HABITAT
ISL1 : NESTING ISLAND SUITABILITY

GRAPH FUNCTION at level 2, position 1
Title: ISL1

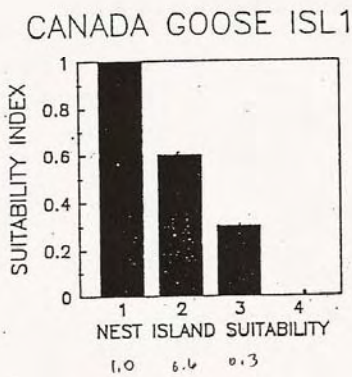
X:	0.000,	Y:	0.000
X:	0.300,	Y:	0.300
X:	0.600,	Y:	0.600
X:	1.000,	Y:	1.000

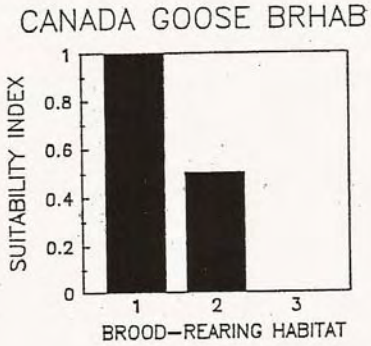
GRAPH FUNCTION at level 2, position 2
Title: BRHAB

X:	0.000,	Y:	0.000
X:	0.500,	Y:	0.500
X:	1.000,	Y:	1.000

Comments:
CODES WERE CONVERTED TO SI, SI WERE THEN USED TO CALCULATE MEANS.
GRAPH FUNCTIONS ARE A RESULT OF CONVERTING CODES TO SI FOR INPUT
ISL1 - NESTING ISLAND SUITABILITY:
1 = AT LEAST ONE ISLAND PRESENT WITH RELATIVELY HIGH SHORELINE/AREA RATIO AND MODERATE VEGETATIVE CANOPY COVER, SI = 1.0
2 = AT LEAST ONE ISLAND PRESENT WITH RELATIVELY LOW SHORELINE/AREA RATIO AND/OR HIGH OR MINIMAL VEGETATIVE CANOPY COVER, SI = 0.6
3 = AT LEAST ONE ISLAND PRESENT WITH NO VEGETATION OR AT LEAST ONE NESTING TUB PRESENT, SI = 0.3
4 = NO ISLAND OR NESTING TUB PRESENT, SI = 0.0
BRHAB - BROOD REARING HABITAT:
1 = MINIMUM 1 ACRE OF ACCESSIBLE PASTURE AND LITTLE OR NO SHORELINE
VER PRESENT AND MINIMAL TO NO COVER SURROUNDING PASTURE AND SUITABLE

ERBACEOUS FORAGE PRESENT, SI = 1.0
= MINIMUM 1 ACRE OF ACCESSIBLE PASTURE AND MODERATE SHORELINE COVER
SENT AND/OR MODERATE COVER SURROUNDING PASTURE OR SUITABLE
RBACEOUS FORAGE PRESENT FOR ONLY PART OF BROODING PERIOD (LATE APRIL-JULY), SI = 0.5
3 = ACCESS TO PASTURE PRECLUDED BY CUTBANK, CLIFF, RIP-RAP, OR BROAD MUD OR SAND BARS OR LESS THAN 1 ACRE IN SIZE OR DENSE VEGETATIVE COVER SURROUNDING PASTURE OR FORAGE NOT SUITABLE, SI = 0


CANADA GOOSE ISL1
SUITABILITY INDEX
1
0.8
0.6
0.4
0.2
0
1 2 3 4
NEST ISLAND SUITABILITY
1.0 0.6 0.3


CANADA GOOSE BRHAB
SUITABILITY INDEX
1
0.8
0.6
0.4
0.2
0
1 2 3
BROOD–REARING HABITAT

Ring-necked Pheasant HSI Model

Library: D:LSNAKE.HLB
3-10-1990

Multi-covertype model.

name: RING-NECKED PHEASANT
Verification level: Applied
Creation/modification date: 12-4-1989

SCS. 1988. NORTH WHITSTAN PHEASANT (MOD.). SCS, WA. (IVAN LINES).

Covertypes:
UF : Forbland
MS : MESIC SHRUB
PFO : Palustrine forested wetland
PSS : Palustrine scrub/shrub wetland
SS : SHRUBSTEPPE
AC : Cropland
P : PASTURE
PEM : Palustrine emergent wetland

LIFE REQUISITE: REPRO
Covertypes:
UF, MS, PFO, PSS, SS, G

Lev 3 Lev 2 Lev 1
VCVHE01--grf------gem-LRSI
VHTHE01--grf-------^

Habitat variables:
VCVHE01 : Percent canopy cover of herbs (non-woody plants: grasses & forbs) (%)
VHTHE01 : Mean height of herbaceous canopy (not of individual plants) (cm)

GRAPH FUNCTION at level 2, position 1
Title: % HERBACEOUS CANOPY COVER
X: 0.000, Y: 0.000
X: 40.000, Y: 0.800
X: 50.000, Y: 1.000
X: 90.000, Y: 1.000
X: 100.000, Y: 0.400

GRAPH FUNCTION at level 2, position 2
Title: HERBACEOUS VEGETATION HEIGHT (CM)
X: 0.000, Y: 0.000
X: 10.000, Y: 0.000
X: 60.000, Y: 1.000
X: 80.000, Y: 1.000

```
     X:      100.000,    Y:    0.000

Comments:
    <none>

-------------------------------------------------------------------------------
LIFE REQUISITE:  WTRCVR
Covertypes:
    UF, MS, PFO, PSS, SS, PEM

                          Lev 3     Lev 2     Lev 1
                           CANPWIN--grf------prd-LRSI
                           DSTWFOD--grf-------^

Habitat variables:
CANPWIN : PERCENT CANOPY COVER OF PERSISTENT WINTER COVER >.5 M  V1
DSTWFOD : DISTANCE TO WINTER FOOD (M) FOR PHEASANT  V2

GRAPH FUNCTION at level 2, position 1
  Title:  % CANOPY OF PERSISTENT WINTER CVR >0.5 M
     X:        0.000,    Y:    0.000
     X:       30.000,    Y:    1.000
     X:       60.000,    Y:    1.000
     X:      100.000,    Y:    0.000

GRAPH FUNCTION at level 2, position 2
  Title:  DIST. (M) TO PREF. WTR. FOOD (MS,AC,UF)
     X:        0.000,    Y:    1.000
     X:      200.000,    Y:    1.000
     X:      400.000,    Y:    0.800
     X:      800.000,    Y:    0.000

Comments:
PREFERRED WINTER FOOD IS PROVIDED BY MESIC SHRUB (MS), CROP (AC),
AND FORB (UF) COVER TYPES MEASURED FROM UF, MS, PFO, PSS, SS & PEM.

-------------------------------------------------------------------------------
LIFE REQUISITE:  WTRFOOD
Covertypes:
    UF, MS, PFO, PSS, SS, G, AC

                          Lev 2     Lev 1
                           FOODCT---mnu-LRSI
```

Habitat variables:
FOODCT : PHEASANT WINTER FOOD TYPE (AC=1,UF=2,MS=3,PFO=4,PSS=5,SS=6,G=7)

MENU FUNCTION at level 1, position 1

Menu choice:	1	Output value:	1.000
Menu choice:	2	Output value:	0.700
Menu choice:	3	Output value:	0.500
Menu choice:	4	Output value:	0.400
Menu choice:	5	Output value:	0.300
Menu choice:	6	Output value:	0.300
Menu choice:	7	Output value:	0.300

Comments:
<none>

LIFE REQUISITE: REPRO
Covertypes:
AC, P

Lev 2 Lev 1
MOWJUN---mnu-LRSI

Habitat variables:
MOWJUN : CROPLAND PLOWED OR MOWED BEFORE JUNE 15 (LOWER SNAKE PHEASANT)
and/or grazing.

MENU FUNCTION at level 1, position 1

Menu choice:	1	Output value:	1.000
Menu choice:	2	Output value:	0.300
Menu choice:	3	Output value:	0.000

Comments:
MENU CHOICES FOR MOWJUN: and or grazing
1 = COVER TYPE NOT MOWED DURING NESTING SEASON (E.G., HMU PASTURES).
2 = COVER TYPE MOWED OR PLOWED BEFORE JUNE 15 (E.G., ~~CROPS~~).
3 = COVER TYPE MOWED OFTEN DURING NESTING SEASON (E.G., GOOSE PASTURES).

DISTANCE FUNCTION:
Title:
< not used >

HSI TREE DIAGRAM:

Lev 3 Lev 2 Lev 1
REPRO----grf------min--HSI

WTRCVR---grf-------:
WTRFOOD--grf-------^

PH FUNCTION at level 2, position 1
itle: EQUIVALENT OPTIMAL AREA FOR REPRODUCTION
X: 0.000, Y: 0.000
X: 80.000, Y: 1.000
X: 100.000, Y: 1.000

GRAPH FUNCTION at level 2, position 2
Title: EQUIVALENT OPTIMAL AREA OF WINTER COVER
X: 0.000, Y: 0.000
X: 30.000, Y: 1.000
X: 100.000, Y: 1.000

GRAPH FUNCTION at level 2, position 3
Title: EQUIVALENT OPTIMAL AREA OF WINTER FOOD
X: 0.000, Y: 0.000
X: 50.000, Y: 1.000
X: 100.000, Y: 1.000

Comments:
<none>

RING-NECKED PHEASENT

LRSI (REPRO 1) = (SI VCVHE01 X SI VHTHE01)$^{1/2}$

= (V1 X V2)$^{1/2}$

LRSI (WTRCVR) = SI CANPWIN X SI DSTWFOD

= V1 X V2

LRSI (WTRFOD) = FOODCT

= V1

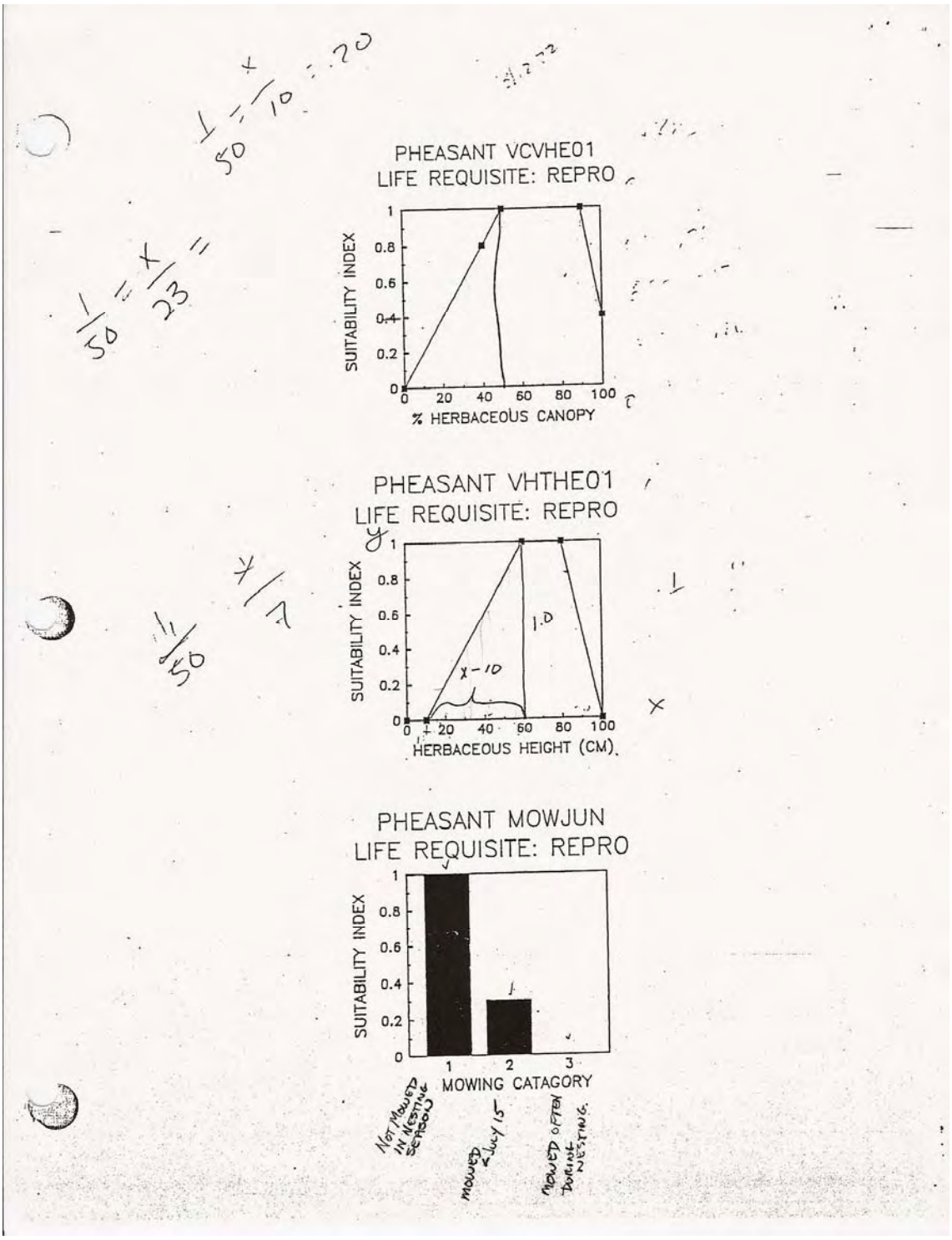
LRSI (REPRO 2) = MOWJUN

= V1

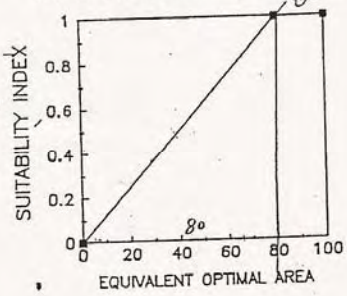
COVER TYPE ACREAGE= RELATIVE AREA
TOTAL ACRES

SUM(RELATIVE AREA X ~~HSI~~ LRSI) = LR EOA

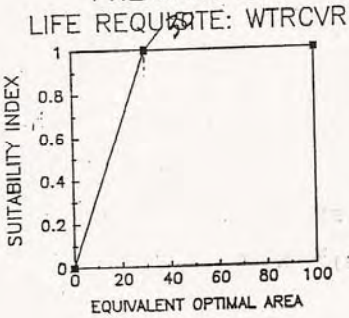
OVERALL HSI = Min. / LR REPRO EOA
- LR WTRCVR EOA
\ LR WTRFOD EOA


PHEASANT VCVHE01
LIFE REQUISITE: REPRO
SUITABILITY INDEX
0
0.2
0.4
0.6
0.8
1
0 20 40 60 80 100
% HERBACEOUS CANOPY
PHEASANT VHTHE01
LIFE REQUISITE: REPRO
SUITABILITY INDEX
1.0
X-10
0 20 40 60 80 100
HERBACEOUS HEIGHT (CM).
PHEASANT MOWJUN
LIFE REQUISITE: REPRO
SUITABILITY INDEX
1 2 3
MOWING CATAGORY
NOT MOWED IN NESTING SEASON
MOWED < JULY 15
MOWED OFTEN DURING NESTING

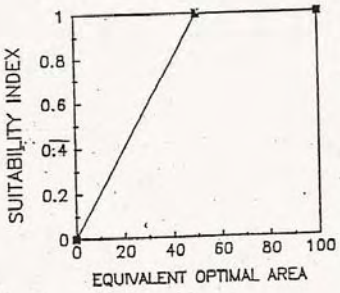
PHEASANT EOA
LIFE REQUISITE: REPRO



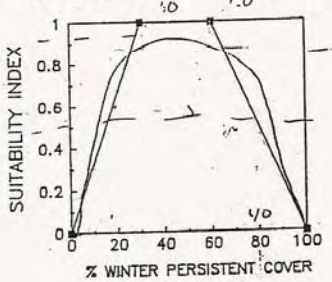
PHEASANT EOA
LIFE REQUISITE: WTRCVR



PHEASANT EOA
LIFE REQUISITE: WTRFOD

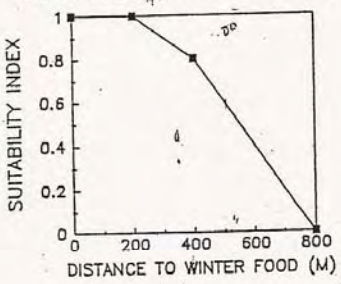


PHEASANT CANPWIN
LIFE REQUISITE: WTRCVR

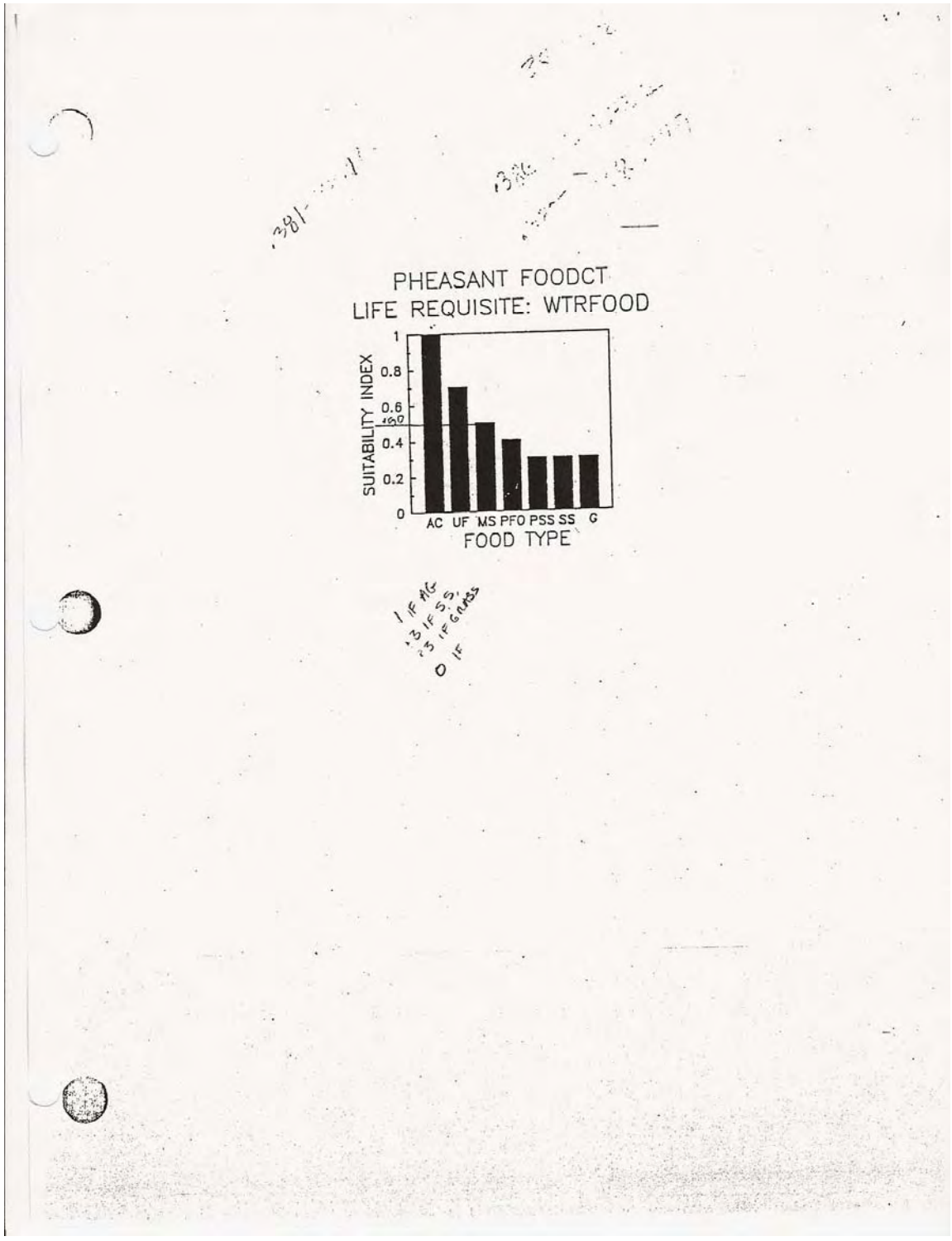


1 IF BTWN 30 & 60%

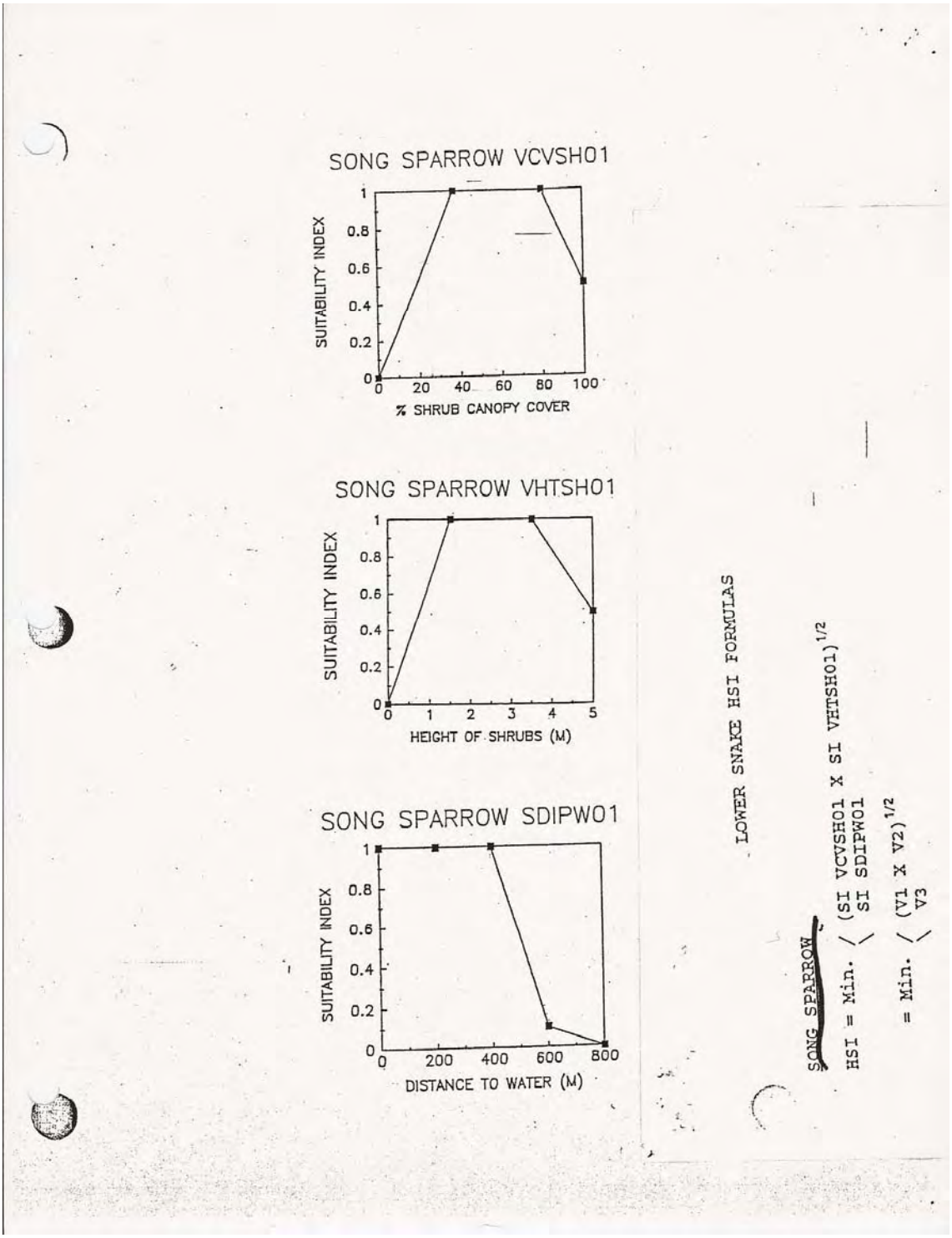
PHEASANT DSTWFOD
LIFE REQUISITE: WTRCVR



1 IF BTWN 0 & 200
0 IF ≥ 800 m


PHEASANT FOODCT
LIFE REQUISITE: WTRFOOD
SUITABILITY INDEX
1
0.8
0.6
0.4
0.2
0
AC UF MS PFO PSS SS G
FOOD TYPE

Song Sparrow HSI Model



Downy Woodpecker HSI Model

Library: D:LSNAKE.HLB
3-10-1990

Single covertype model.

Model name: DOWNY WOODPECKER
Verification level: EXPERT REVIEW
Creation/modification date: 10-12-1989

SCHROEDER, R. L. 1982. HABITAT SUITABILITY INDEX MODELS:
DOWNY WOODPECKER. U.S. FISH WILDL. SERV. BIOL. REP.
FWS/OBS-82/10.38. 10 PP.
Range: throughout the species' range.

Covertypes:
PFO : Palustrine forested wetland

```
                        Lev 3    Lev 2    Lev 1
                         VBAW001--grf------min--HSI
                         VDNSN03--grf-------^
```

Habitat variables:
VBAW001 : Basal area of trees (if cut at 1.4m high) (m^2/ha)
VDNSN03 : Density of snags that have >15cm DBH (#/ha)

PH FUNCTION at level 2, position 1
Title: BASAL AREA (M2 / HA)

X:	0.000,	Y:	0.000
X:	10.000,	Y:	1.000
X:	20.000,	Y:	1.000
X:	30.000,	Y:	0.500
X:	40.000,	Y:	0.500

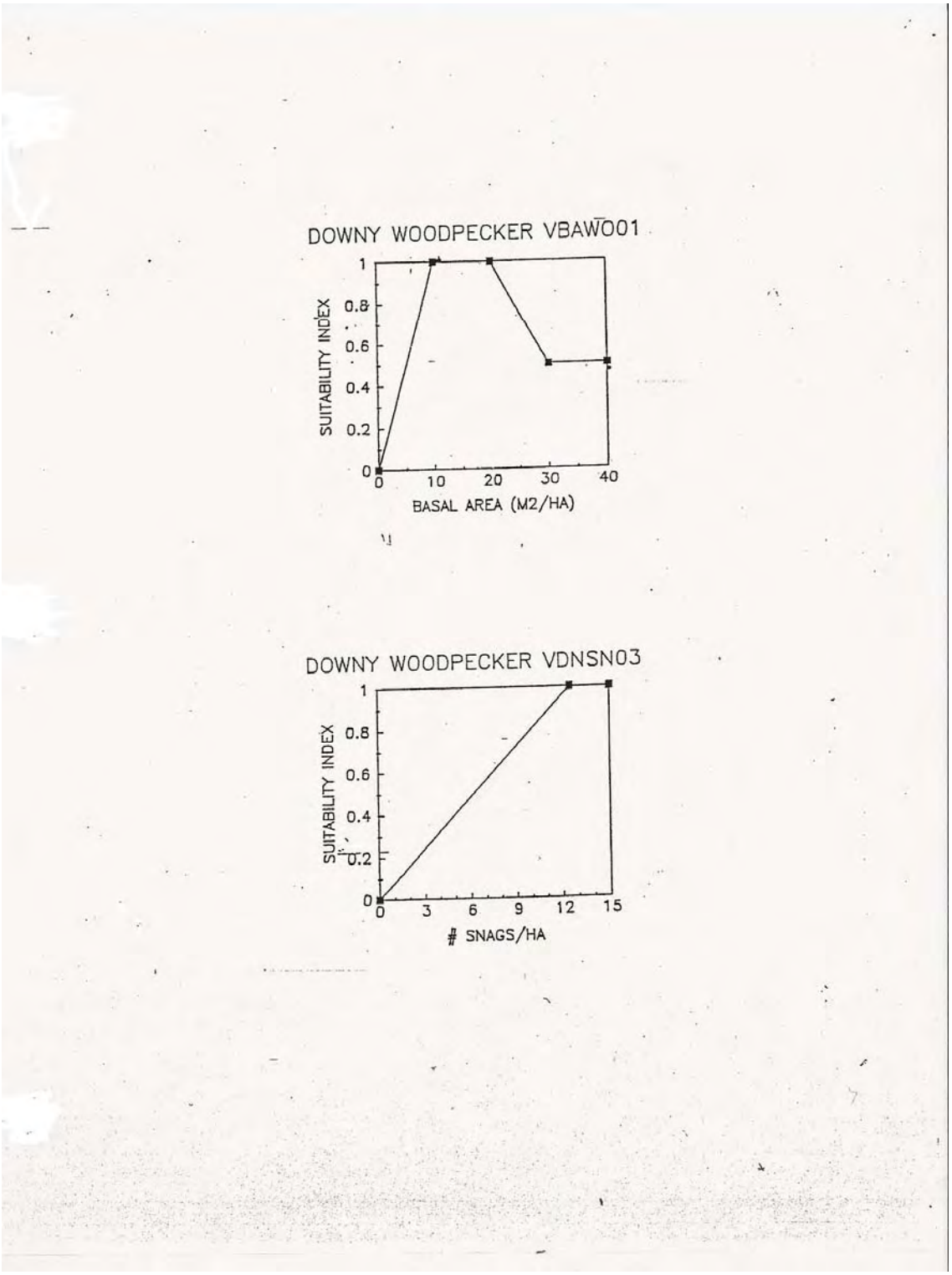
GRAPH FUNCTION at level 2, position 2
Title: # SNAGS > 15 CM DBH / HA

X:	0.000,	Y:	0.000
X:	12.500,	Y:	1.000
X:	15.000,	Y:	1.000

Comments:
Density of snags rescaled to /ha.

DOWNY WOODPECKER

```
HSI = Min. / SI VBAW001
          \ SI VDNSN03

    = Min. / V1
          \ V2
```


DOWNY WOODPECKER VBAWO01
SUITABILITY INDEX
1
0.8
0.6
0.4
0.2
0
0
10
20
30
40
BASAL AREA (M2/HA)
DOWNY WOODPECKER VDNSN03
SUITABILITY INDEX
1
0.8
0.6
0.4
0.2
0
0
3
6
9
12
15
SNAGS/HA

APPENDIX B

Agency: ODFW
Project Area: Simonis
Transect: 1

Photo:

Field data:

SHRUB TRANSECT RESULTS

Area: Conley Lake
Date of study: 05/25/05
Transect Number: 1
Investigators: Ashley, Wagoner, Wilkinson

Covertype: Riparian Forest (1B)
Transect Type point intercept
Unit of measure: ft
Interval: 5 ft
Sample unit size: 100
Height unit of measure: 0.10 ft

	GPS COORDINATES		Mag AZ	Length
Start				
Turning Pt.				
Turning Pt.				
Turning Pt.				
End			Total Length	0

Shrub Intercept Data: 120 POINTS NEEDED — 120 POINTS ENTERED — 68 POINTS are BARE

Species	N	% CC	Mean height	s	%cc s	y	%cc y	m	%cc m	d	%cc d	vd	%cc vd	dd	%cc dd
rose	42	35.0%	60.1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
current	5	4.2%	43.4	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
p.l. willow	0	0.0%		0	n/a	0	n/a	0	n/a	0	n/a	0	n/a	0	n/a
hawthorn	5	4.2%	138.0	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%

AGE DISTRIBUTION	N	%
Seedling	0	
Young	0	
Mature	0	
Decadent	0	
Very Decadent	0	
Dead	0	

Overall Height	
MEAN	66.0
MODE	45.0
MAX	180.0
MIN	9.0
ST.DEV	34.3
TOTAL CC	43.3%

AGE KEY

Symbol	Meaning
s	seedling
y	young
m	mature
d	decadent
vd	very decadent
dd	dead

MICROPLOT RESULTS

Area: Conley Lake
Date of study: 05/25/05
Transect Number: 1
Investigators: Ashley, Wagon

Covertype: Riparian Forest
Transect Type point-intercept
Unit of measure: feet
Interval: Ind.
Number of plots 18

	GPS COORDINATES		Mag AZ	Length
Start				
Turning Point				
Turning Point				
Turning Point				
End			Total Length	0

Microplot Data: 18 PLOTS NEEDED — 18 PLOTS ENTERED — 0 PLOTS BARE
Microplot frame size: 0.10 m sq.
Plot interval: 25 ft
Mean Veg height 10.9 0.10 ft
% CC TOTAL 100.0%

			GRASS % CC	FORB % CC	EXOTIC % CC
%CC	dist to roost	7.7%			
%CC	% palatable	0.0%			
%CC	dist to escape	0.0%			
%CC	% persistant veg	0.0%			
			TOTAL %cc Grass 0.0%	TOTAL %cc Forbs 0.0%	TOTAL %cc Exotic 0.0%

Habitats & Wildlife

TREE TRANSECT RESULTS

Area: Conley Lake
Date of study: 05/25/05
Transect Number: 1
Investigators: Ashley, Wagoner, W
Covertype: Riparian Forest (1B)
Transect Type point intercept
Unit of measure: ft
Interval: 10 ft

Sample unit size: 100
Height unit of measure: ft

	GPS COORDINATES		Mag AZ	Length
Start				
Turning Pt.				
Turning Pt.				
Turning Pt.				
End			Total Length	0

60 POINTS NEEDED — 90 POINTS ENTERED — 14 POINTS are BARE

Species	N	% CC	Mode DBH	<4"	%CC	4" to 6"	%CC	6" to 10"	%CC	10" to 20"	%CC	> 20"	%CC	NT	%CC
beachleaf willow	76	84.4%	<4	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	76	84.4%

DBH DISTRIBUTION	N	%
Small (<4")	0	0.0%
Medium (4" - 6")	0	0.0%
Medium large (6" - 10")	0	0.0%
Large (10" - 20")	0	0.0%
Very Large (>20")	0	0.0%
DBH not taken	76	100.0%

Overall tree height	
MEAN	45.0
MODE	45
MAX	45
MIN	45
ST.DEV	0.00
TOTAL CC	84.44%

Habitats & Wildlife

SNAG TRANSECT RESULTS

Area: Conley Lake
Date of study: 05/25/05
Transect Number: 1
Investigators: Ashley, Wagoner, Wilkinson, E
Covertype: Riparian Forest
Belt width 44 ft in.
Belt legnth 100 ft in.
Circular plot size:
Height unit of measure: ft

	GPS COORDINATES		Mag AZ	Length
Start				
Turning Pt.				
Turning Pt.				
Turning Pt.				
End			Total Length	0

Plots needed 8 **Plots entered** 8

DBH DISTRIBUTION	PLOT 1	PLOT 2	PLOT 3	PLOT 4	PLOT 5	PLOT 6	PLOT 7	PLOT 8	PLOT 9	PLOT 10	TOTAL SNAGS	AVERAGE per BELT
No snags	Sampled	Sampled	Sampled	No snags	No snags	No snags	Sampled	No snags	Not Sampled	Not Sampled		
<4"	0	0	0	0	0	0	2	0			2	0.3
> 4" =< 6"	1	1	0	0	0	0	0	0			2	0.3
> 6" to 10"	0	5	0	0	0	0	0	0			5	0.6
>10" to 20"	0	0	2	0	0	0	0	0			2	0.3
> 20"	0	0	0	0	0	0	0	0			0	N/A
Not recorded	0	0	0	0	0	0	0	0			0	N/A
TOTAL snags	1	6	2	0	0	0	2	0			11	1.4

AVERAGE HEIGHT	PLOT 1	PLOT 2	PLOT 3	PLOT 4	PLOT 5	PLOT 6	PLOT 7	PLOT 8	PLOT 9	PLOT 10	Weighted average height	
No snags	Sampled	Sampled	Sampled	No snags	No snags	No snags	Sampled	No snags	Not Sampled	Not Sampled		
<4"	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			N/A	
> 4" =< 6"	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			N/A	
> 6" to 10"	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			N/A	
>10" to 20"	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			N/A	
> 20"	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Not recorded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			N/A	
Mean height	0.00	0.00	0.00	N/A	N/A	N/A	0.00	N/A			#DIV/0!	#DIV/0!

habitats & wildlife

BASAL AREA									
Project:	Simonis		Transect #:	1B	Date:	23-May-05	Recorder:	Ashley	
		Transect Length							
Sample Unit	Mean BA	300 feet	400 feet	500 feet	600 feet	700 feet	800 feet	900 feet	1,000 feet
0' - 100'					10				
100 '- 200'					14				
200' - 300'					6				
300' - 400'	Mean BA	0.0			5				
400' - 500'		Mean BA	0.0		10				
500' - 600'			Mean BA	0.0	12				
600' - 700'				Mean BA	95.0				
700' - 800'					Mean BA	0.0			
800' - 900'						Mean BA	0.0		
900' - 1,000'							Mean BA	0.0	
								Mean BA	0.0

Agency: ODFW
Project Area: Simonis
Transect: 2

Photo:

Field data:

MICROPLOT RESULTS

Area: Simonis
Date of study: 05/23/05
Transect Number: 2
Investigators: Ashley, Wagon

Covertype: grassland
Transect Type point intercept
Unit of measure: feet
Interval: Ind.
Number of plots 12

	GPS COORDINATES		Mag AZ	Length
Start	426013	5010641	220	300
Turning Point				
Turning Point				
Turning Point				
End	425937	5010593	Total Length	300

Microplot Data: 12 PLOTS NEEDED 12 PLOTS ENTERED 0 PLOTS BARE
Microplot frame size: 0.10 m sq. **Mean Veg height** 19.7 0.10 ft
Plot interval: 25 ft **% CC TOTAL** 99.6%

			GRASS % CC	FORB % CC	EXOTIC % CC
%CC	% palatable	2.3%	% comp grass 94.0%	% forb 0.0%	% exotics 0.0%
%CC	dist to escape	0.9%			
%CC	dist to roost	1000.0%			
%CC	dist to perch	189.6%			
			TOTAL %cc Grass 94.0%	TOTAL %cc Forbs 0.0%	TOTAL %cc Exotic 0.0%

Habitats & Wildlife

Agency: ODFW
Project Area: Simonis
Transect: 3

Photo:

Field data:

MICROPLOT RESULTS

Area: Simonis
Date of study: 05/23/05
Transect Number: 3
Investigators: Ashley, Wagon

Covertype: grassland
Transect Type point-intercept
Unit of measure: feet
Interval: Ind.
Number of plots 8

	GPS COORDINATES		Mag AZ	Length
Start	425453	5010590	84	200
Turning Point				
Turning Point				
Turning Point				
End	425512	5010580	Total Length	200

Microplot Data: 8 PLOTS NEEDED 10 PLOTS ENTERED 0 PLOTS BARE
Microplot frame size: 0.10 m sq.
Plot interval: 25 ft
Mean Veg height 9.7 0.10 ft
% CC TOTAL 97.0%

			GRASS % CC		FORB % CC		EXOTIC % CC
%CC	%palatable	95.0%	% comp grass	100.0%	% forb	0.0%	% exotics	0.0%
%CC	escape	0.5%						
%CC	perch	15.5%						
%CC	roost	1000.0%						
			TOTAL %cc Grass	100.0%	TOTAL %cc Forbs	0.0%	TOTAL %cc Exotic	0.0%

Habitats & Wildlife

Agency: ODFW
Project Area: Simonis
Transect: 4

Photo:

Field data:

MICROPLOT RESULTS

Area: Simonis
Date of study: 05/23/05
Transect Number: 4
Investigators: Ashley, Wagon

Covertype: grassland
Transect Type point intercept
Unit of measure: feet
Interval: Ind.
Number of plots

	GPS COORDINATES		Mag AZ	Length
Start	425711	5011267	154	300
Turning Point				
Turning Point				
Turning Point				
End	425724	5011181	Total Length	300

Microplot Data: 0 PLOTS NEEDED 12 PLOTS ENTERED 0 PLOTS BARE
Microplot frame size: 0.10 m sq.
Plot interval: 25 ft
Mean Veg height 18.0 0.10 ft
% CC TOTAL 96.7%

				GRASS % CC		FORB % CC		EXOTIC % CC	
	%CC	% palatable	0.9%	comp grass	70.7%	% forb	0.0%	% exotics	0.0%
	%CC	escape	1.1%						
	%CC	roost	283.3%						
	%CC	perch	35.0%						
Habitats & Wildlife				TOTAL %cc Grass	70.7%	TOTAL %cc Forbs	0.0%	TOTAL %cc Exotic	0.0%

Agency: ODFW
Project Area: Simonis
Transect: 5

Photo:

Field data:

MICROPLOT RESULTS

Area: Simonis
Date of study: 05/23/05
Transect Number: 5
Investigators: Ashley, Wagon

Covertype: grassland
Transect Type point intercept
Unit of measure: feet
Interval: Ind.
Number of plots 12

	GPS COORDINATES		Mag AZ	Length
Start	425478	5011352	322	300
Turning Point				
Turning Point				
Turning Point				
End	425451	5011440	Total Length	300

Microplot Data: 12 **PLOTS NEEDED** 12 **PLOTS ENTERED** 0 **PLOTS BARE**
Microplot frame size: 0.10 m sq. **Mean Veg height** 4.1 0.10 ft
Plot interval: 25 ft **% CC TOTAL** 86.7%

				GRASS % CC		FORB % CC		EXOTIC % CC	
%CC	% palatable	23.6%		comp grass	46.3%	% forb	0.0%	% exotics	0.0%
%CC	escape	11.7%							
%CC	perch	100.0%							
%CC	roost	212.5%							
				TOTAL %cc Grass	46.3%	TOTAL %cc Forbs	0.0%	TOTAL %cc Exotic	0.0%

Habitats & Wildlife

Agency: ODFW
Project Area: Simonis
Transect: 6

Photo:

Field data:

MICROPLOT RESULTS

Area: Simonis
Date of study: 05/23/05
Transect Number: 6
Investigators: Ashley, Wagon

Covertype: grassland
Transect Type PI
Unit of measure: feet
Interval: Ind.
Number of plots 12

	GPS COORDINATES		Mag AZ	Length
Start	425436	5011534	316	300
Turning Point				
Turning Point				
Turning Point				
End	425400	5011619	Total Length	300

Microplot Data: 12 **PLOTS NEEDED** 12 **PLOTS ENTERED** 0 **PLOTS BARE**
Microplot frame size: 0.10 m sq.
Plot interval: 25 ft
Mean Veg height 9.4 0.10 ft
% CC TOTAL 98.3%

			GRASS % CC		FORB % CC		EXOTIC % CC	
%CC	% palatable	52.9%	comp grass	59.6%	% forb	0.0%	% exotics	0.0%
%CC	escape	1.5%						
%CC	perch	57.1%						
%CC	roost	581.3%						
			TOTAL %cc Grass	59.6%	TOTAL %cc Forbs	0.0%	TOTAL %cc Exotic	0.0%

Habitats & Wildlife

Agency: ODFW
Project Area: Simonis
Transect: 7

Photo:

Field data:

MICROPLOT RESULTS

Area: Simonis
Date of study: 05/23/05
Transect Number: 7
Investigators: Ashley, Wagon

Covertype: grassland
Transect Type Point intercept
Unit of measure: feet
Interval: Ind.
Number of plots

	GPS COORDINATES		Mag AZ	Length
Start	425620	5011535	254	300
Turning Point				
Turning Point				
Turning Point				
End	425529	5011546	Total Length	300

Microplot Data: 0 **PLOTS NEEDED** 12 **PLOTS ENTERED** 0 **PLOTS BARE**
Microplot frame size: 0.10 m sq.
Mean Veg height 14.6 0.10 ft
Plot interval: 25 ft
% CC TOTAL 99.8%

				GRASS % CC	FORB % CC	EXOTIC % CC
%CC	% palatable	0.0%	comp grass	76.7%	% forb 0.0%	% exotics 0.0%
%CC	escape	0.1%				
%CC	perch	30.0%				
%CC	roost	950.0%				
			TOTAL %cc Grass	76.7%	TOTAL %cc Forbs 0.0%	TOTAL %cc Exotic 0.0%

Habitats & Wildlife

Agency: ODFW
Project Area: Simonis
Transect: 8

Photo:

Field data:

MICROPLOT RESULTS

Area: Simonis
Date of study: 05/23/05
Transect Number: 8
Investigators: Ashley, Wagon

Covertype: Grassland
Transect Type PI
Unit of measure: feet
Interval: Ind.
Number of plots 20

	GPS COORDINATES		Mag AZ	Length
Start	425255	5010826	180	200
Turning Point				
Turning Point				
Turning Point				
End	425236	5010769	Total Length	200

Microplot Data: 20 **PLOTS NEEDED** 20 **PLOTS ENTERED** 0 **PLOTS BARE**
Microplot frame size: 0.10 m sq. **Mean Veg height** 4.1 0.10 ft
Plot interval: 10 ft **% CC TOTAL** 71.5%

				GRASS % CC		FORB % CC		EXOTIC % CC	
	%CC	% palatable	62.0%	comp grass	96.0%	% forb	0.0%	% exotics	0.0%
	%CC	escape	48.1%						
	%CC	roost	695.0%						
	%CC	perch	45.4%						
Habitats & Wildlife				TOTAL %cc Grass	96.0%	TOTAL %cc Forbs	0.0%	TOTAL %cc Exotic	0.0%

Agency: ODFW
Project Area: Simonis
Transect: 9

Photo:
N/A

Field data:

MICROPLOT RESULTS

Area: Simonis
Date of study: 05/24/05
Transect Number: 9
Investigators: Ashley, Wagon

Covertype: emergent wetland
Transect Type point intercept
Unit of measure: feet
Interval: Ind.
Number of plots 12

	GPS COORDINATES		Mag AZ	Length
Start	424734	5011317	146	150
Turning Point	424746	5011275	64	150
Turning Point				
Turning Point				
End	424793	5011266	Total Length	300

Microplot Data: 12 **PLOTS NEEDED** 12 **PLOTS ENTERED** 12 **PLOTS BARE**
Microplot frame size: 0.10 m sq.
Plot interval: 25 ft
Mean Veg height 0.0 0.10 ft
% CC TOTAL 0.0%

						FORB % CC		EXOTIC % CC
%CC	% emergent	41.7%	water depth	3.9%	% forb	0.0%	% exotics	0.0%
%CC	% stiff	0.0%						
%CC	% reed canary	0.0%						
%CC	% other veg	41.7%						

Habitats & Wildlife

TOTAL %cc Grass 3.9% **TOTAL %cc Forbs** 0.0% **TOTAL %cc Exotic** 0.0%

Agency: ODFW

Project Area: Simonis
Transect: 10

Photo:

Field data:

MICROPLOT RESULTS

Area: Simonis
Date of study: 05/25/05
Transect Number: 10
Investigators: Ashley, Wagon

Covertype: emergent wetland
Transect Type PI
Unit of measure: feet
Interval: Ind.
Number of plots 36

	GPS COORDINATES		Mag AZ	Length
Start	424901	5011324	160	200
Turning Point	424909	5011263	70	400
Turning Point	425031	5011267	56	300
Turning Point				
End	425116	5011306	Total Length	900

Microplot Data: 36 **PLOTS NEEDED** 36 **PLOTS ENTERED** 36 **PLOTS BARE**
Microplot frame size: 0.10 m sq.
Plot interval: 25 ft
Mean Veg height 0.0 0.10 ft
% CC TOTAL 0.0%

					FORB % CC		EXOTIC % CC
%CC	% emergent veg	53.7%	water depth	3.6%	% forb	0.0%	% exotics 0.0%
%CC	% stiff	3.7%					
%CC	% reed canary	6.3%					
%CC	% other veg	43.8%					
			TOTAL %cc Grass	3.6%	TOTAL %cc Forbs	0.0%	TOTAL %cc Exotic 0.0%

Habitats & Wildlife

Agency: ODFW

Project Area: Simonis
Transect: 11

Photo:

Field data:

MICROPLOT RESULTS

Area: Simonis
Date of study: 05/25/05
Transect Number: 11
Investigators: Ashley, Wagon

Covertype: emergent wetland
Transect Type point intercept
Unit of measure: feet
Interval: Ind.
Number of plots 36

	GPS COORDINATES		Mag AZ	Length
Start	425049	5010980	308	300
Turning Point	424993	5011063	280	300
Turning Point	424911	5011107	308	300
Turning Point				
End			Total Length	900

Microplot Data: 36 **PLOTS NEEDED** 37 **PLOTS ENTERED** 37 **PLOTS BARE**
Microplot frame size: 0.10 m sq.
Plot interval: 25 ft
Mean Veg height 0.0 0.10 ft
% CC TOTAL 0.0%

					FORB % CC		EXOTIC % CC
%CC	% emergent veg	62.3%	water depth	2.7%	% forb	0.0%	% exotics 0.0%
%CC	% stiff	0.1%					
%CC	% reed canary	10.5%					
%CC	% other veg	51.6%					

Habitats & Wildlife

TOTAL %cc Grass 2.7% **TOTAL %cc Forbs** 0.0% **TOTAL %cc Exotic** 0.0%

Agency: ODFW

Project Area: Simonis
Transect: 12

Photo:

Field data:

MICROPLOT RESULTS

Area: Simonis
Date of study: 05/25/05
Transect Number: 12
Investigators: Ashley, Wagon

Covertype: emergent wetland
Transect Type PI
Unit of measure: feet
Interval: Ind.
Number of plots 12

	GPS COORDINATES		Mag AZ	Length
Start	425355	5010767	111	300
Turning Point				
Turning Point				
Turning Point				
End	425426	5010710	Total Length	300

Microplot Data: 12 **PLOTS NEEDED** 12 **PLOTS ENTERED** 12 **PLOTS BARE**
Microplot frame size: 0.10 m sq.
Plot interval: 25 ft
Mean Veg height 0.0 0.10 ft
% CC TOTAL 0.0%

					FORB % CC		EXOTIC % CC
%CC	% emergent veg	1.0%	water depth	10.8%	% forb	0.0%	% exotics 0.0%
%CC	% stiff	0.0%					
%CC	% reed canary	0.0%					
%CC	% other veg	1.0%					

Habitats & Wildlife

TOTAL %cc Grass 10.8% **TOTAL %cc Forbs** 0.0% **TOTAL %cc Exotic** 0.0%

Agency: ODFW

Project Area: Simonis
Transect: 13

Photo:

Field data:

MICROPLOT RESULTS

Area: Simonis
Date of study: 05/25/05
Transect Number: 13
Investigators: Ashley, Wagon

Covertype: emergent wetland
Transect Type PI
Unit of measure: feet
Interval: Ind.
Number of plots 8

	GPS COORDINATES		Mag AZ	Length
Start	425354	5010812	66	200
Turning Point				
Turning Point				
Turning Point				
End	425412	5010827	Total Length	200

Microplot Data: 8 **PLOTS NEEDED** 8 **PLOTS ENTERED** 8 **PLOTS BARE**
Microplot frame size: 0.10 m sq.
Plot interval: 25 ft
Mean Veg height 0.0 0.10 ft
% CC TOTAL 0.0%

					FORB % CC		EXOTIC % CC
%CC	% emergent veg	47.5%	water depth	16.4%	% forb	0.0%	% exotics 0.0%
%CC	% stiff	47.5%					
%CC	% reed canary	0.0%					
%CC	% other veg	0.0%					
			TOTAL %cc Grass	16.4%	TOTAL %cc Forbs	0.0%	TOTAL %cc Exotic 0.0%

Habitats & Wildlife

Agency: ODFW

Project Area: Wallender
Transect: 1

Photo:

Field data:

MICROPLOT RESULTS

Area: Wallender
Date of study: 05/24/05
Transect Number: 1
Investigators: Ashley, Wagon

Covertype: grassland
Transect Type PI
Unit of measure: feet
Interval: Ind.
Number of plots 24

	GPS COORDINATES		Mag AZ	Length
Start	423825	5012253	344	300
Turning Point	423822	5012345	29	300
Turning Point				
Turning Point				
End	423892	5012403	Total Length	600

Microplot Data: 24 PLOTS NEEDED 24 PLOTS ENTERED 0 PLOTS BARE
Microplot frame size: 0.10 m sq. **Mean Veg height** 3.5 0.10 ft
Plot interval: 25 ft **% CC TOTAL** 87.5%

			GRASS % CC		FORB % CC		EXOTIC % CC	
%CC	% palatable	2.8%	comp grass	39.3%	% forb	0.0%	% exotics	0.0%
%CC	escape	28.2%						
%CC	roost	505.6%						
%CC	perch	26.0%						
			TOTAL %cc Grass	39.3%	TOTAL %cc Forbs	0.0%	TOTAL %cc Exotic	0.0%

Habitats & Wildlife

Agency: ODFW
Project Area: Wallender
Transect: 2

Photo:

Field data:

MICROPLOT RESULTS

Area: Wallender
Date of study: 05/24/05
Transect Number: 2
Investigators: Ashley, Wagon

Covertype: emergent wetland
Transect Type PI
Unit of measure: feet
Interval: Ind.
Number of plots 20

	GPS COORDINATES		Mag AZ	Length
Start	424276	5012479	174	400
Turning Point				
Turning Point				
Turning Point				
End	424257	5012357	Total Length	400

Microplot Data: 20 **PLOTS NEEDED** 20 **PLOTS ENTERED** 20 **PLOTS BARE**
Microplot frame size: 0.10 m sq. **Mean Veg height** 0.0 0.10 ft
Plot interval: 25 ft **% CC TOTAL** 0.0%

						FORB % CC		EXOTIC % CC
	%CC	% emergent	39.3%	water depth	4.9%	% forb	0.0%	% exotics 0.0%
	%CC	% stiff	2.1%					
	%CC	% reed canary	2.7%					
	%CC	% other veg	34.7%					
Habitats & Wildlife				TOTAL %cc Grass	4.9%	TOTAL %cc Forbs	0.0%	TOTAL %cc Exotic 0.0%

Agency: ODFW
Project Area: Wallender
Transect: 3

Photo:

Field data:
Ocular estimate, refer to Transect Summary Field Sheet and/or CD for assigned SI values.

Agency: ODFW
Project Area: Wallender
Transect: 4

Photo:
N/A

Field data:

MICROPLOT RESULTS

Area: Wallender
Date of study: 05/24/05
Transect Number: 4
Investigators: Ashley, Wagon

Covertype: emergent wetland
Transect Type PI
Unit of measure: feet
Interval: Ind.
Number of plots 13

	GPS COORDINATES		Mag AZ	Length
Start	424736	5012376	150	250
Turning Point				
Turning Point				
Turning Point				
End	424752	5012300	Total Length	250

Microplot Data: 13 **PLOTS NEEDED** 13 **PLOTS ENTERED** 13 **PLOTS BARE**
Microplot frame size: 0.10 m sq.
Plot interval: 25 ft
Mean Veg height 0.0 0.10 ft
% CC TOTAL 0.0%

			GRASS % CC	FORB % CC	EXOTIC % CC
%CC	% emergent veg	4.7%	water depth 14.1%	% forb 0.0%	% exotics 0.0%
%CC	% stiff	2.3%			
%CC	% reed canary	0.0%			
%CC	% other veg	2.4%			
			TOTAL %cc Grass 14.1%	TOTAL %cc Forbs 0.0%	TOTAL %cc Exotic 0.0%

Habitats & Wildlife

Agency: ODFW
Project Area: Wallender
Transect: 5

Photo:

Field data:
Ocular estimate, refer to Transect Summary Field Sheet and/or CD for assigned SI values.

Agency: ODFW
Project Area: Wallender
Transect: 6

Photo:

Field data:

MICROPLOT RESULTS

Area: Wallender
Date of study: 05/24/05
Transect Number: 6
Investigators: Ashley, Wagon

Covertype: emergent wetland
Transect Type PI
Unit of measure: feet
Interval: Ind.
Number of plots 10

	GPS COORDINATES		Mag AZ	Length
Start	424989	5012148	360	300
Turning Point				
Turning Point				
Turning Point				
End	425015	5012235	Total Length	300

Microplot Data: 10 PLOTS NEEDED 15 PLOTS ENTERED 15 PLOTS BARE
Microplot frame size: 0.10 m sq. **Mean Veg height** 0.0 0.10 ft
Plot interval: 25 ft **% CC TOTAL** 0.0%

					FORB % CC		EXOTIC % CC
%CC	% emergent veg	7.0%	water depth	18.7%	% forb	0.0%	% exotics	0.0%
%CC	% stiff	5.9%						
%CC	% reed canary	0.0%						
%CC	% other veg	1.1%						
			TOTAL %cc Grass	18.7%	TOTAL %cc Forbs	0.0%	TOTAL %cc Exotic	0.0%

Habitats & Wildlife

Agency: ODFW
Project Area: Wallender
Transect: 7

Photo:

Field data:
Ocular estimate, refer to Transect Summary Field Sheet and/or CD for assigned SI values.

Agency: ODFW
Project Area: Wallender
Transect: 8

Photo:

Field data:

MICROPLOT RESULTS

Area: Wallender
Date of study: 05/24/05
Transect Number: 8
Investigators: Ashley, Wagon

Covertype: emergent wetland
Transect Type PI
Unit of measure: feet
Interval: Ind.
Number of plots 79

	GPS COORDINATES		Mag AZ	Length
Start	425249	50113191	1	300
Turning Point				
Turning Point				
Turning Point				
End	425279	5013274	Total Length	300

Microplot Data: 79 **PLOTS NEEDED** 79 **PLOTS ENTERED** 79 **PLOTS BARE**
Microplot frame size: 0.10 m sq. **Mean Veg height** 0.0 0.10 ft
Plot interval: 5 ft **% CC TOTAL** 0.0%

					FORB % CC		EXOTIC % CC
%CC	% emergent veg	4.6%	water depth	20.9%	% forb	0.0%	% exotics 0.0%
%CC	% stiff	0.2%					
%CC	% reed canary	4.0%					
%CC	% other veg	0.4%					
Habitats & Wildlife			**TOTAL %cc Grass**	20.9%	**TOTAL %cc Forbs**	0.0%	**TOTAL %cc Exotic** 0.0%

Agency: ODFW
Project Area: Wallender
Transect: 9

Photo:

Field data:

SHRUB TRANSECT RESULTS

Area: Wallender
Date of study: 05/24/05
Transect Number: 9
Investigators: Ashley, Wagoner, Wilkinson

Covertype: Riparian Shrub
Transect Type point intercept
Unit of measure: ft
Interval: 5 ft
Sample unit size: 100 ft
Height unit of measure: 0.10 ft

	GPS COORDINATES		Mag AZ	Length
Start	425240	5013414	198	300
Turning Pt.				
Turning Pt.				
Turning Pt.				
End	425205	5013332	Total Length	300

Shrub Intercept Data: **60** POINTS NEEDED **60** POINTS ENTERED **3** POINTS are BARE

Species	N	% CC	Mean height	s	%cc s	y	%cc y	m	%cc m	d	%cc d	vd	%cc vd	dd	%cc dd
peachleaf willow	28	46.7%	178.2	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
yellow willow	27	45.0%	106.1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
coyote willow	2	3.3%	95.0	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%

AGE DISTRIBUTION	N	%
Seedling	0	
Young	0	
Mature	0	
Decadent	0	
Very Decadent	0	
Dead	0	

Overall Height	
MEAN	141.1
MODE	120.0
MAX	250.0
MIN	40.0
ST.DEV	53.7
TOTAL CC	95.0%

AGE KEY

Symbol	Meaning
s	seedling
y	young
m	mature
d	decadent
vd	very decadent
dd	dead

MICROPLOT RESULTS

Area: Wallender
Date of study: 05/24/05
Transect Number: 9
Investigators: Ashley, Wagon

Covertype: Riparian shrub
Transect Type point intercept
Unit of measure: feet
Interval: Ind.
Number of plots 12

	GPS COORDINATES		Mag AZ	Length
Start	425240	5013414	198	300
Turning Point				
Turning Point				
Turning Point				
End	425205	5013332	Total Length	300

Microplot Data: **12** PLOTS NEEDED **12** PLOTS ENTERED **0** PLOTS BARE
Microplot frame size: **).10 m sq.** **Mean Veg height** **41.3** **0.10 ft**
Plot interval: **25 ft** **% CC TOTAL** **80.8%**

			GRASS % CC	FORB % CC	EXOTIC % CC
%CC	% persistant veg	80.8%		% forb 0.0%	% exotics 0.0%
%CC	escape	0.4%			
%CC	roost	7.6%			
%CC	% palatable	0.0%			
			TOTAL %cc Grass 0.0%	TOTAL %cc Forbs 0.0%	TOTAL %cc Exotic 0.0%

Habitats & Wildlife

Agency: ODFW
Project Area: Wallender
Transect: 10

Photo:

Field data:
Ocular estimate, refer to Transect Summary Field Sheet and/or CD for assigned SI values.

Agency: ODFW
Project Area: Wallender
Transect: 11

Photo:

Field data:

MICROPLOT RESULTS

Area: Wallender
Date of study: 05/24/05
Transect Number: 11
Investigators: Ashley, Wagon

Covertype: grassland
Transect Type point intercept
Unit of measure: feet
Interval: Ind.
Number of plots 10

	GPS COORDINATES		Mag AZ	Length
Start	425021	5013277	140	200
Turning Point				
Turning Point				
Turning Point				
End	425045	5013221	Total Length	200

Microplot Data: 10 PLOTS NEEDED 10 PLOTS ENTERED 0 PLOTS BARE
Microplot frame size: 0.10 m sq.
Plot interval: 25 ft
Mean Veg height 6.7 0.10 ft
% CC TOTAL 89.8%

				GRASS % CC		FORB % CC		EXOTIC % CC	
%CC	% palatable	89.8%	comp grass	95.9%	% forb	0.0%	% exotics	0.0%
%CC	escape	4.0%						
%CC	perch	4.6%						
%CC	roost	507.5%						
			TOTAL %cc Grass	95.9%	TOTAL %cc Forbs	0.0%	TOTAL %cc Exotic	0.0%

Habitats & Wildlife

Agency: ODFW
Project Area: Wallender
Transect: 12

Photo:

Field data:

TREE TRANSECT RESULTS

Area: Wallender
Date of study: 05/24/05
Transect Number: 12
Investigators: Ashley, Wagoner, W
Covertype: Riparian Forest
Transect Type Point intercept
Unit of measure: ft
Interval: 5 ft

Sample unit size: 100 ft
Height unit of measure: ft

	GPS COORDINATES		Mag AZ	Length
Start	425131	5013195	greenline346	400
Turning Pt.				
Turning Pt.				
Turning Pt.				
End	425183	5013337	Total Length	400

80 POINTS NEEDED **80** POINTS ENTERED **7** POINTS are BARE

Species	N	% CC	Mode DBH	<4"	%CC	4" to 6"	%CC	6" to 10"	%CC	10" to 20"	%CC	> 20"	%CC	NT	%CC
salix	73	91.3%	<4	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	73	91.3%

DBH DISTRIBUTION	N	%
Small (<4")	0	0.0%
Medium (4" - 6")	0	0.0%
Medium large (6" - 10")	0	0.0%
Large (10" - 20")	0	0.0%
Very Large (>20")	0	0.0%
DBH not taken	73	100.0%

Overall tree height	
MEAN	#DIV/0!
MODE	#N/A
MAX	0
MIN	0
ST.DEV	#DIV/0!
TOTAL CC	91.25%

Habitats & Wildlife

MICROPLOT RESULTS

Area: Wallender
Date of study: 05/24/05
Transect Number: 12
Investigators: Ashley, Wagon

Covertype: Riparian Forest
Transect Type p
Unit of measure: feet
Interval: Ind.
Number of plots

	GPS COORDINATES		Mag AZ	Length
Start	425131	5013195	greenline346	400
Turning Point				
Turning Point				
Turning Point				
End	425183	5013337	Total Length	400

Microplot Data: 0 PLOTS NEEDED 16 PLOTS ENTERED 0 PLOTS BARE

Microplot frame size: 0.10 m sq.
Plot interval: 25 ft

Mean Veg height 6.4 0.10 ft
% CC TOTAL 70.6%

			GRASS % CC	FORB % CC	EXOTIC % CC
%CC	% persistant veg	6.9%		% forb 0.0%	% exotics 0.0%
%CC	escape	4.9%			
%CC	roost	8.4%			
%CC	% palatable	6.6%			
			TOTAL %cc Grass 0.0%	TOTAL %cc Forbs 0.0%	TOTAL %cc Exotic 0.0%

Habitats & Wildlife

BASAL AREA									
Project:	Wallender		Transect #:	12	Date:	24-May-05	Recorder:	Wagoner, Ellis	
		Transect Length							
Sample Unit	Mean BA	300 feet	400 feet	500 feet	600 feet	700 feet	800 feet	900 feet	1,000 feet
0' - 100'			7						
100 '- 200'			5						
200' - 300'			7						
300' - 400'	Mean BA	0.0	6						
400' - 500'		Mean BA	62.5						
500' - 600'			Mean BA	0.0					
600' - 700'				Mean BA	0.0				
700' - 800'					Mean BA	0.0			
800' - 900'						Mean BA	0.0		
900' - 1,000'							Mean BA	0.0	
								Mean BA	0.0

Agency: ODFW
Project Area: North City
Transect: 1

Photo:

Field data:

MICROPLOT RESULTS

Area: North City
Date of study: 05/23/05
Transect Number: 1
Investigators: Ashley, Wagon

Covertype: grassland
Transect Type point intercept
Unit of measure: feet
Interval: Ind.
Number of plots 12

	GPS COORDINATES		Mag AZ	Length
Start	425371	5014386	178	300
Turning Point				
Turning Point				
Turning Point				
End	425374	5014286	Total Length	300

Microplot Data: 12 **PLOTS NEEDED** 12 **PLOTS ENTERED** 0 **PLOTS BARE**

Microplot frame size: 0.10 m sq. **Mean Veg height** 3.4 0.10 ft

Plot interval: 25 ft **% CC TOTAL** 92.5%

				GRASS % CC		FORB % CC		EXOTIC % CC	
	%CC	% palatable	36.5%	% comp grass	92.5%	% forb	0.0%	% exotics	0.0%
	%CC	dist to escape	35.4%						
	%CC	dist to roost	65.4%						
	%CC	dist to perch	21.3%						
Habitats & Wildlife				TOTAL %cc Grass	92.5%	TOTAL %cc Forbs	0.0%	TOTAL %cc Exotic	0.0%

Agency: ODFW
Project Area: North City
Transect: 2

Photo:
N/A

Field data:

SHRUB TRANSECT RESULTS

Area: North City
Date of study: 05/24/05
Transect Number: 2
Investigators: Ashley, Wagoner, Wilkinson

Covertype: Riparian Shrub
Transect Type point-intercept
Unit of measure: ft.
Interval: 2 ft.
Sample unit size: 100 ft
Height unit of measure: 0.10 ft

	GPS COORDINATES		Mag AZ	Length
Start	425384	5013869	60	100
Turning Pt.	425414	5013877	102	100
Turning Pt.	425436	5013865	67	100
Turning Pt.				
End	425471	5013860	Total Length	300

Shrub Intercept Data: **150** POINTS NEEDED **150** POINTS ENTERED **86** POINTS are BARE

Species	N	% CC	Mean height	s	%cc s	y	%cc y	m	%cc m	d	%cc d	vd	%cc vd	dd	%cc dd
coyote willow	64	42.7%	59.6	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%

AGE DISTRIBUTION	N	%
Seedling	0	
Young	0	
Mature	0	
Decadent	0	
Very Decadent	0	
Dead	0	

Overall Height	
MEAN	59.6
MODE	65.0
MAX	120.0
MIN	28.0
ST.DEV	17.3
TOTAL CC	42.7%

AGE KEY

Symbol	Meaning
s	seedling
y	young
m	mature
d	decadent
vd	very decadent
dd	dead

MICROPLOT RESULTS

Area: North City
Date of study: 05/24/05
Transect Number: 2
Investigators: Ashley, Wagoner

Covertype: Rip. Shrub
Transect Type point intercept
Unit of measure: feet
Interval: Ind.
Number of plots 12

	GPS COORDINATES		Mag AZ	Length
Start	425384	5013869	60	100
Turning Point	425414	5013877	102	100
Turning Point	425436	5013865	67	100
Turning Point				
End	425471	5013860	Total Length	300

Microplot Data: **12** PLOTS NEEDED **12** PLOTS ENTERED **4** PLOTS BARE

Microplot frame size: 0.10 m sq.
Plot interval: 25 ft

Mean Veg height 13.4 0.10 ft
% CC TOTAL 48.3%

			GRASS % CC	FORB % CC	EXOTIC % CC
%CC	% palatable	0.0%	% comp grass 0.0%	% forb 0.0%	% exotics 0.0%
%CC	% persistant veg	81.7%			
%CC	dist to escape	3.4%			
%CC	dist to roost	142.4%			
			TOTAL %cc Grass 0.0%	TOTAL %cc Forbs 0.0%	TOTAL %cc Exotic 0.0%

Habitats & Wildlife

Agency: ODFW
Project Area: Conley Lake
Transect: 1

Photo:

Field data:

MICROPLOT RESULTS

Area: Conley Lake
Date of study: 05/25/05
Transect Number: 1
Investigators: Ashley, Wagon

Covertype: Grassland
Transect Type point-intercept
Unit of measure: feet
Interval: Ind.
Number of plots 23

	GPS COORDINATES		Mag AZ	Length
Start	429858	5022535	151	300
Turning Point	429882	5022446	106	300
Turning Point				
Turning Point				
End	429961	5022399	Total Length	600

Microplot Data: 23 PLOTS NEEDED 23 PLOTS ENTERED 0 PLOTS BARE
Microplot frame size: 0.10 m sq.
Plot interval: 25 ft
Mean Veg height 3.0 0.10 ft
% CC TOTAL 31.0%

			GRASS % CC		FORB % CC		EXOTIC % CC	
%CC	% palatable	7.7%	% comp. grass	80.9%	% forb	0.0%	% exotics	0.0%
%CC	dist to escape	60.4%						
%CC	dist to perch site	347.8%						
%CC	dist to roost	2402.8%						
			TOTAL %cc Grass	80.9%	TOTAL %cc Forbs	0.0%	TOTAL %cc Exotic	0.0%

Habitats & Wildlife

Agency: ODFW
Project Area: Conley Lake
Transect: 2

Photo:

Field data:

MICROPLOT RESULTS

Area: Conley Lake
Date of study: 05/25/05
Transect Number: 2
Investigators: Ashley, Wagone

Covertype: emergent wetland
Transect Type point intercept
Unit of measure: feet
Interval: Ind.
Number of plots 23

	GPS COORDINATES		Mag AZ	Length
Start	429980	5022315	170	600
Turning Point				
Turning Point				
Turning Point				
End	429987	5022138	Total Length	600

Microplot Data: 23 **PLOTS NEEDED** 23 **PLOTS ENTERED** 23 **PLOTS BARE**
Microplot frame size: 0.10 m sq.
Plot interval: 25 ft
Mean Veg height 0.0 0.10 ft
% CC TOTAL 0.0%

					FORB % CC		EXOTIC % CC
%CC	% emergent veg	50.9%	water depth	1.9%	% forb	0.0%	% exotics 0.0%
%CC	% stiff veg	0.0%					
%CC	% reed canary	0.0%					
%CC	% other veg	50.9%					
			TOTAL %cc Grass	1.9%	TOTAL %cc Forbs	0.0%	TOTAL %cc Exotic 0.0%

Habitats & Wildlife